American Society of Civil Engineers.

PROCEEDINGS.

Vol. XIX.—January, 1893.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to the Society.)

OF THE SOCIETY.

JANUARY 4TH, 1893.—The Society met at 20 o'clock, President Cohen in the chair. F. Collingwood, Secretary. Ballots were canvassed and the following candidates were declared elected: As Members, John Watson Alvord, Chicago, Ill.; James Francis, Lowell, Mass.; Alfred Rosenzweig, Mexico, Mexico; Henry Norlande Ruttan, Winnipeg, Manitoba.

As Associate Members: Kennerley Bryan, Chicago, Ill.; Shrewsbury Beauregard Miller, Hoboken, N. J.

A paper by Alva J. Grover, Assoc. M. Am. Soc. C. E., on "Flood Waves in Sewers and their Automatic Measurement," was read by the Secretary, and discussed by Mr. Clemens Herschel.

Edward Bates Dorsey, M. Am. Soc. C. E., described the successful work of the Improvement of the Harbor of Tampico, Mexico.

Announcement was made of the deaths of J. N. DuBarry, M. Am. Soc. C. E., on December 17th, 1892, and of H. Stanley Goodwin, M. Am. Soc. C. E., on December 25th, 1892.

THE ANNUAL MEETING, JANUARY 18TH, 1893.

The meeting was called to order at 10 o'clock by the President, Mr. Mendes Cohen.

The PRESIDENT.—The Society will please come to order in Annual Meeting. The first duty before us is the appointment of Tellers to canvass the ballot for officers for the election which takes place to-day.

The Chair would name Messrs. H. B. Seaman, Charles W. Gay and A. M. Van Auken, who have kindly consented to serve the Society in that capacity. The ballot, by a provision of the Constitution, will close at 12 o'clock, up to which hour any members who have not yet voted are at liberty to present their ballots. Promptly at 12 o'clock the Chair will declare the ballot closed, and then the Tellers can take the boxes and proceed to the count.

The next matter will be the announcements by the Secretary, if you have any to make, sir.

F. COLLINGWOOD, Secretary.—I am requested by Mr. C. W. Hunt, who has had the matter in charge, to announce that the programme, as printed, will be strictly carried out; that the only possible change might be that caused by the ice in the rivers, which may necessitate the abandonment of the trip by water; but the Committee does not propose to attempt any change unless it is absolutely necessary.

I also have to announce that since the last meeting of the Society we have lost by death Cook Talcott, M. Am. Soc. C. E., who died on January 12th, and Alfred B. Ellsworth, Jun. Am. Soc. C. E., who died on January 10th.

The PRESIDENT.—The next business is the report of the Board of Direction.

The Secretary read the report of the Board of Direction, which will be found on page 30.

The PRESIDENT.—Mr. Secretary, I will interrupt you for one moment. The Chair has been reminded that the practice of the past has been for the Tellers to commence their canvass at once without waiting for the close of the ballot, so that they might get through at an hour before the adjournment of the meeting. If there be no objection to that course they will be authorized to proceed as has been the practice heretofore.

The Tellers can proceed with their count; the ballot not to close until 12 o'clock.

The Secretary continued the reading of the report of the Board of Direction.

The PRESIDENT.—Gentlemen, you have heard the report of the Board of Direction; what is your pleasure in regard to it?

Mr. E. P. NORTH.—I move it be accepted, and placed on file. (Seconded and carried.)

The PRESIDENT.—The next in order is the report of the Treasurer. It has been suggested to the Chair that under Section 3, Article 7 of the Constitution, it is provided that the ballots shall be canvassed publicly by Tellers appointed by the presiding officer. The Chair would simply remind members present, that, although the Tellers have retired to an adjoining room, the count is entirely open if they desire to have anything to do with it.

The Secretary read the report of the Treasurer (see page 37).

The Secretary read the report of the Finance Committee (see page 42).

Gentlemen, you have heard the report of the Treasurer of the Society; what is your pleasure in regard to it?

Mr. CHARLES B. BRUSH.—I move that the same be accepted and placed on file. (Carried.)

The Secretary read the report of the Auditor (see page 38).

Gentlemen, you have heard the report of the Auditor; what is your pleasure in regard to it?

Mr. BRUSH.—I move it be accepted and placed on file. (Carried.) I now move the report of the Finance Committee be accepted and placed on file. It has already been read.

The PRESIDENT.—I think, sir, it was appended to the report of the Treasurer as an indication that the Treasurer's report had been duly examined. Next in order will be the report of the Committee on the award of the Norman Medal.

I think we have Past President George S. Greene with us; if he will take a seat upon the platform, I am sure it will please the Society. (Mr. Greene took a seat upon the platform.)

The Secretary read the report of the Board of Censors to award the Norman Medal (see page 42).

The PRESIDENT.—Gentlemen, you have heard the report of the Committee on award of the Norman Medal; what is your pleasure?

A MEMBER.—I move it be accepted and placed on file.

The PRESIDENT.—It is moved that the report of the Committee on award of the Norman Medal be accepted and placed on file and the action of the Committee be confirmed. (Carried).

The Secretary read the report of the Committee on award of the Rowland Prize (see page 42).

Gentlemen, you have heard the report of the Committee on award of the Rowland Prize; what is your pleasure in regard to it?

Mr. ROBERT L. READ.—I move it be accepted and placed on file and the action of the Committee confirmed. (Carried.)

The PRESIDENT.—The report of the Committee on Uniform Standard Time, Mr. Sandford Fleming, Chairman.

The Secretary read a letter from Mr. Sandford Fleming, as follows:

OTTAWA, January 16th, 1893.

Secretary American Society of Civil Engineers:

DEAR SIR,—I regret extremely that I am prevented at the last moment from proceeding to New York, as I fully intended, to be present at the Annual Meeting.

It has not been contemplated by the Special Committee on Standard Time to present on this occasion a formal report, as there is not

much to add to that which has already been submitted. The past year has not, however, been without progress, and I intended explaining verbally what had been done had I been present at the meeting to be held on Wednesday.

During the past summer I have had personal experience of what already has been accomplished in Europe in the adoption of standard time, having proceeded to St. Petersburg to attend the great International Railway Congress held in the capital of Russia last August. I traveled through a great part of Europe between Norway and Sweden in the North and Spain in the South, and I can say that excellent results have been reached in the time-reform movement throughout the greater part of Central and Eastern Europe. Letters which I have received from France, Belgium and elsewhere go to show that in Southern Europe the number of persons who acknowledge the necessity of time-reform increases yearly, that there are influences in active operation which will contribute to prepare people's minds for a change, and that there is already an inclination, especially in Italy and Switzerland, to bring about the reform tolerably soon.

It is satisfactory to learn from another part of the globe, viz., Australia, that the people of that far-off continent are now being awakened to the importance of the time-reform movement. This is due mainly to the publications of this Society, and especially to the annual reports for the last two years which have found their way to engineers, railway managers and scientific societies. In these quarters I have learned that the time-reforms long advocated by this Society find very cordial and general support.

At a conference held at Melbourne at the end of October it was unanimously resolved to take means to remove all legislative obstacles to the adoption of standard time. A bill was to be brought into Parliament, when it next assembled, for that purpose, and as all the railway authorities were in favor of the change, no serious opposition was contemplated. Bearing on the subject I deem it proper to state that in a letter received by the last mail from the Royal Geographical Society of Australasia, I am charged by the Honorary Secretary, Mr. I. P. Thomson, himself a civil engineer, to convey the most cordial congratulations to the American Society of Civil Engineers on the success which has attended the efforts of this body to reform the time-reckoning of the world.

The letters referred to which I have received within the past few weeks denote almost the first sign of the time-reform movement having reached Australia, and it will be gratifying to the members attending the Annual Meeting to be made aware that the influence of this Society is operating, not only throughout Europe, but likewise at the Antipodes.

Again, I regret that I shall not be present in person.

Yours very truly,

SANDFORD FLEMING.

The PRESIDENT.—Gentlemen, you have heard the report of Mr. Sandford Fleming, the Chairman of the Committee on Uniform Standard Time; what is your pleasure in regard to it? Will the Society take action?

Mr. NORTH.—I move it be accepted and placed on file. (Carried.)

Mr. JOHN BOGART.—Will that continue the Committee, Mr. President?

The PRESIDENT.—I do not know that it will, sir. If there is a motion either to continue the Committee, or that it be discharged—the Committee have done such good work in the past that I should think a motion to continue it would be eminently proper.

Mr. BOGART.—I missed a portion of the report, and do not know whether the Committee wish a continuance.

The SECRETARY.—There is no wish expressed.

Mr. NORTH.—I think, Mr. President, that the labors of the Committee have been valuable, and that their labors are generally appreciated. When I moved that the report be accepted I did not say anything about continuing the Committee because I thought it would continue naturally. If it is necessary to make a motion I will amend the motion, and move that the report be accepted with thanks, and the Committee continued. (Seconded.)

The PRESIDENT.—It is moved and seconded that the thanks of the Society be added to the resolution to accept the report, and that the Committee be continued; those in favor of the adoption of the resolution in that shape will please say "aye." (Carried.)

The next matter will be the report of the Committee on Uniform Methods of Testing Materials Used in Metallic Structures, and on Requirements for these Materials to Further Improve the Grade of such Structures; have you any report, Mr. Secretary?

The SECRETARY.—No report has been received.

The PRESIDENT.—The next report will be the report on Standard Rail Sections.

The SECRETARY.—I understand that that Committee is now in session.

Mr. BOGART.—I think I may say that as the Committee is in session in the Secretary's room, I have no doubt you will have a report during the day.

The PRESIDENT.—Is the report of the Committee on Domestic Water Supply here?

The SECRETARY.—No, sir.

Mr. DESMOND FITZGERALD.—A report has been made. I suppose perhaps Mr. Fteley, who is not here, has the report.

The PRESIDENT.—We may fairly suppose that it will come in at a later moment. Is there any report on Units of Measurement?

The SECRETARY.—No, sir. I have a statement to make. Some few

months ago the resignation of the Chairman, Mr. Eggleston, was received. The Board then made an appointment to fill the vacancy, but it has not been accepted, so it will be necessary to continue the Committee, if the Society thinks proper so to do.

Mr. CLEMENS HERSCHEL.—Mr. President, is it necessary to continue all these committees? Take a committee that has made no report at all; is that not continued unless a motion is made to another effect? The Committee on Standard Methods of Testing Materials—is that committee continued unless a motion is made?

The PRESIDENT.—The question is asked of the Chair; the Chair will decide that a committee does continue until it is discharged by the Society itself. The only reason for continuing the Committee, after a report by the Committee, is because the Society may consider that there is something further of value to be obtained from it, so in the absence of any report there is no occasion for any action by the Society, unless it desires to take such action.

Mr. NORTH.—Is there any question as to the continuance of this Committee on Units of Measurement?

Mr. BOGART.—That will require a motion.

Mr. NORTH.—I would like to ask, as a matter of information, whether the Committee, if it was re-constituted and found another chairman, would produce anything of any value?

The PRESIDENT.—Your inquiry is with regard to the Committee on Units of Measurement? The Chair is unable to say, sir. In the absence of any motion to discharge the Committee, it will continue as heretofore until we get a report or until the Society takes action.

The report of the Board of Direction in regard to the matter of Badge of the Society is now in order.

The Secretary read the report as follows:

The Society, at its business meeting of the Convention of 1892 at Fort Monroe, requested the Board of Direction to consider and report to this meeting recommendations in relation to the badge of the Society.

The Board has, with the aid of a committee of its members, given due consideration to the subject and submits the following report.

The Board recognizes that there is a decided feeling of dissatisfaction, more or less outspoken, on the part of a number of the members of the Society in regard to the present badge.

The badge has been severely criticised from several points of view. The most important criticism is that it does not properly typify the Society.

While the Board is convinced of the fact that there is this dissatisfaction, it yet has no means of determining the full extent thereof, and, therefore, recommends that, inasmuch as the use of the badge is voluntary as far as the individual members are concerned, the membership

be canvassed through the medium of a suitable interrogatory circular to be sent out by the Board of Direction for the purpose of eliciting complete information on the subject before proceeding to the serious study of a new design.

The Board believes that the circular should be prefaced by a short history of the present badge, including the official record of the extent to which it has been used by members, with a request for a brief and impartial statement from all, of the reasons for and against the change.

On receipt of responses to the circular a summary of the replies can be prepared and submitted to the Society for its further action.

By order of the Board.

F. COLLINGWOOD,
Secretary.

The PRESIDENT.—Gentlemen, you have heard the report of the Board of Direction on this matter; what is your pleasure?

A MEMBER.—I move it be adopted.

The PRESIDENT.—It is moved and seconded that the report of the Board of Direction be accepted. (Carried.)

Mr. BRUSH.—That is a report of the Board and there is a certain definite recommendation in it. I do not quite understand whether the member meant, not only to accept the report, but also to adopt the recommendation; I am a little anxious about it. If that is what the Society means I accept it, but I want it clearly understood what it does mean.

Mr. HERSCHEL.—That is precisely what the member meant; he meant that it is a good recommendation, and, in his opinion, the Society should adopt it. It is more parliamentary to say, "I move that the report be accepted and its recommendation adopted."

The PRESIDENT.—Gentlemen, you have heard the amended resolution——

Mr. NORTH.—I would like to ask the gentleman if he would like me to suggest an amendment to that motion, an addition to it that the Committee be instructed not to entertain any proposition looking to making a mechanical nightmare of any portion of that badge?

The PRESIDENT.—Will the gentleman please reduce this resolution to writing?

Mr. NORTH.—Perhaps it will be as well to find out whether Mr. Herschel will accept the amendment before I go to the expense of writing it down.

Mr. HERSCHEL.—I would prefer that the gentleman would kindly withdraw the addition and let the Committee have full and free action.

Mr. NORTH.—I will withdraw it.

The PRESIDENT.—It has been moved that the report of the Board be accepted and its recommendation adopted. (Carried.)

The PRESIDENT.—At the Convention at Fortress Monroe the past summer the Society in business meeting requested that the Board should investigate and report to this Annual Meeting upon some suitable method of selecting the Nominating Committee; the Board has performe l that duty and presents its report.

The Secretary read the report, as follows:

The Board of Direction, in compliance with the request of the last Annual Convention that it should report to the Annual Meeting a plan for effecting the selection of the Nominating Committee, recommends the following :

First.—At its March meeting in each year the Board of Direction shall divide the territory occupied by the membership of the Society into seven geographical districts, each of which shall contain, as nearly as may be practicable, an equal number of Corporate Members of the Society ; and shall recommend to the business meeting of the Annual Convention that the Nominating Committee shall be made up of one Corporate Member from each of said geographical districts.

Second.—The business meeting of the Annual Convention shall meet on the second day of the Convention, and, after transacting such business as may come before it, shall hold an adjourned session at a stated hour of a day before the date fixed for the close of the Convention. At this first session of the business meeting, the geographical districts previously established by the Board of Direction shall be announced, and the Corporate Members present shall be requested to assemble by districts and agree upon the names of two Corporate Members, either of whom will be, if elected by the Convention, a proper and suitable member of the Nominating Committee. To facilitate the assembling and organization of such district meetings, the President shall name from the Corporate Members present at the Convention from each district one who shall act as temporary chairman at the meeting of his district, and the Secretary shall turn over to such temporary chairman any communications he may have received from Corporate Members of that district relating to the appointment of a member of the Nominating Committee.

Each temporary chairman thus appointed shall call a meeting of the Corporate Members present from his district, and at each of the said meetings the names of two Corporate Members of the respective districts shall be chosen as suitable persons, either of whom is presented as an acceptable member of the Nominating Committee ; and the chairmen of the district meetings shall notify the Secretary of the Society of the action taken.

Provided, however, that if it be found that any district is represented at the Convention by less than five Corporate Members present, such district meeting shall make no nomination for membership in the Nominating Committee, but shall, through its chairman, report the

facts to the Secretary; and the chairman shall return to the latter any communications he may have received bearing upon the question, which communications shall be presented to the Convention.

Third.—At the adjourned session of the business meeting of the Convention the nominations presented by the several district meetings shall be announced, and the meeting shall proceed to elect by written ballot one Corporate Member from each district, as a member of the Nominating Committee. A majority of the ballots cast shall be necessary to a choice.

Fourth.—The Secretary shall, at least 30 days before the meeting of the Annual Convention, mail to each Corporate Member of the Society a circular calling attention to the method hereby recommended for selecting the Nominating Committee and requesting him to confer with such of his fellow members in his own district as he may conveniently reach; and either to be present at the Convention or to communicate to the Secretary for himself, or for them, the names of two Corporate Members in his district whom he or they would prefer to present to the Convention as candidates of their district for members of the Nominating Committee. Communications received in reply thereto shall be handed by the Secretary to the temporary chairman of the district meeting of the Convention.

The PRESIDENT.—Gentlémen, you have heard the report of the Board of Direction in relation to the matter of selection of the Nominating Committee; what is your pleasure in regard to it?

If you adopt this report the Secretary would, in accordance with its recommendation, send out such notice in due time the coming year, and that would have the machinery put in motion for effecting the nomination in time for the next Annual Convention. The whole matter of selecting the committee, however, is by a constitutional provision entirely in the hands of the Society at the Convention, and this is merely a recommendation of a method to bring it about under the Constitution. What is your pleasure in regard to the report?

Mr. BRUSH.—I move that the report be received and its recommendation adopted. (Carried.)

The PRESIDENT.—Are the committees already called ready to report? Is the Committee on Uniform Methods of Testing ready to report?

Is the Committee on Standard Rail Sections ready to report?

Is the Committee on Impurities of Domestic Water Supply ready to report?

They are not yet ready, Mr. Secretary.

The SECRETARY.—I have an announcement to make.

The Secretary read a letter from the Secretary of the Engineers' Club, tendering the courtesies of the Club to the members during the Annual Meeting.

The PRESIDENT.—Gentlemen, you have heard the communication from the Engineers' Club.

Mr. BRUSH.—I move that the same be received and placed on file, with the thanks of the members of the Society. (Carried.)

The PRESIDENT.—In the absence of reports from the committees the time might be occupied by any miscellaneous business. Any communications from members present? Have you any communications, Mr. Secretary, to submit?

Has any member present anything to submit for the action of the Society?

Mr. NORTH.—I would like, Mr. President, to call the attention of those members here who have any interest in Macadam roads to a paper by James Owen, M. Am. Soc. C. E., on "Disputed Points in Road Building," and to say that the Secretary has extra copies of that paper which will come up for discussion on the 15th of February, and those who are in a position to add any light to that subject I believe Mr. Owen would be very glad to have take copies of that paper and discuss it. The papers can be obtained from the Secretary.

Mr. ROBERT L. READ.—Mr. President, if miscellaneous business is now in order I will read a letter addressed to the Board of Direction of this Society by the Cincinnati Association. With that was received by the Board of Direction a letter, stating that they found the matter could not come before the Board, under the Constitution, but had to come before this meeting, or, rather, before the Society. I will read the communication.

CINCINNATI, O., January 9th, 1893.

To the Board of Direction, American Society of Civil Engineers,
New York City:

GENTLEMEN,—At a meeting of the Cincinnati Association of Members of the American Society of Civil Engineers, held January 6th, 1893, the subject of a Code of Ethics for Civil Engineers was discussed, and it was the opinion of those present that the time has come when it is both possible and desirable that a Code of Ethics for the guidance of the members of the profession of Civil Engineering should be formulated and adopted.

We, the undersigned, therefore, request that if the proposition meets with the approval of your honorable Board, the matter be brought to the attention of the approaching Annual Meeting of the Society.

We would respectfully suggest that a special committee be appointed under the provisions of Article VI, Section 13, whose duties shall be:

1st. To consider the propriety of the adoption by the Society of a Code of Ethics for the profession.

2d. If the Committee shall decide that it is desirable and advisable that a Code of Ethics should be adopted by the Society, they shall proceed to prepare and report to the Society at some future meeting such a code of professional ethics.

Very respectfully,

S. WHINERY.	LATHAM ANDERSON.
G. BOUSCAREN.	JOHN W. HILL.
ROBERT L. ENGLE.	CHARLES HERMANY.
G. B. NICHOLSON.	EDWIN THACHER.
ROBERT L. READ.	H. P. MCDONALD.
S. M. FELTON.	GRANVILLE W. SHAW.
W. B. RUGGLES.	THOMAS P. SHANKS.

THE PRESIDENT.—Have you any motion to offer, sir ?

Mr. READ.—For the purpose of bringing this before you, I will make this motion. That a special committee be appointed to consider the propriety of the adoption by the Society of a code of ethics of the profession. If the committee shall decide that it should be adopted by the Society, they shall proceed to prepare and report to the Society such a code of ethics. (Seconded.)

Mr. HERSCHEL.—Mr. President, I desire to speak to the motion. This is the begining, as I take it, of an important step in the history, not only of this Society, but of the whole engineering profession. It has been a mooted point, it is to-day a mooted point, whether civil engineers constitute a profession. There is probably not a man here that has not felt in the course of his practice the cogency of a question of that sort. If he goes deeper and thinks of the various kinds of treatment that he has often undergone, he will have brought to his mind a very realizing sense of the importance of that question, and it is yet a question. Is a civil engineer a member of a profession, or is he merely following some calling ? Is he hired to do this and to do that, to go and to come, to be engaged and be discharged by mere whims ? What are the relations of civil engineers to each other ? Now, Mr. President, if we look for guidance to the experience of what are thought to be professions, and in times past there were only three, that of law, of medicine and of theology, we can gain a great deal of valuable information for our action. We are all aware that this subject has been very much discussed in engineering journals, in two of them at least, the *Engineering News* and the *Engineering Record*, for some months past, and I am quite convinced that my reading of those several articles and conversations with various members has been of a great deal of instruction to me. This is my excuse for addressing this assembly at this time, the fact that I have given some attention to the subject in the last three or four months. I find that other associations have these codes of ethics. Lawyers have always had their reference to such

codes of ethics. Doctors have always had them. It is the same with them as with lawyers ; it is by reason of their following codes of ethics that they are treated with the respect due to professional men. It is by reason of the absence of a code of ethics that civil engineers presumably have not been considered professional men, and, as near as I can understand the matter, have not the respect that is given to professional men by the general public.

If the gentlemen here all knew as well as I do who is the author of the admirable articles that I have alluded to in the *Engineering Record* on this subject, they would value them, I have no doubt, only the more. There is a wealth of experience on which those articles have been founded that cannot but be of benefit to professional men.

What is the meaning of a movement in this direction ? As near as I understand the matter, among civil engineers in the United States, some have been rodmen, some have been educated in, some out, of schools. The Society from the beginning has endeavored to say to the public that whoever is a member of this Society may undoubtedly be considered a civil engineer. That also is one of the reasons for having the engineering profession considered a profession, namely, that there shall be some body, some public body, some society, which shall pass upon the qualifications of the candidate and say whether or not he shall be considered a civil engineer and it is all right that within such a society the standing, the professional standing, of its members shall be subjected to definite rules, to a court of ethics—a court of ethics and a code of ethics, a court and a code. Mr. President, I trust this motion will pass ; that the committee will do good work in the line that has been designated. I trust they will establish a standing committee from the government of the Society as one of its attributes, and that the Society will adopt a code of ethics, and this committee will then be empowered to act as a court of ethics.

A MEMBER.—I want to hear the motion.

The PRESIDENT.—Will Mr. Read present that resolution in writing to the Secretary ? This does not appear to be very clearly in the form of a resolution ; if you will just amend it with the Secretary and get it into the form of a resolution it can be acted upon.

The Chair would avail itself of this interval to remind members present that the ballot will close at 12 o'clock and that if there are any present who have not yet voted for officers, the count is now going on; there are but five minutes in which to deposit those ballots.

Mr. DESMOND FITZGERALD.—I want to say one word in regard to this resolution. I trust that this code of ethics will be so drawn as to define the relations of engineers, not only to each other, but also to the public, and that that may be embodied in Mr. Read's resolution so that it will come properly before the Society.

The SECRETARY (reading the resolution)—

Resolved, That a special committee be appointed whose duties shall be, first, to consider the propriety of the adoption by the Society of a code of ethics for the profession; second, that if the committee shall decide that it is desirable and advisable that a code of ethics should be adopted by the Society, it shall proceed to prepare and report to the Society at a some future meeting such a code of professional ethics.

Mr. FITZGERALD.—It does not define what that code of ethics is.

Mr. THEODORE COOPER.—Mr. President, it strikes me that this is very pretty, but when we look over our profession, as we call it, and which we must acknowledge in our hearts is not a profession, you will find the difficulties are very great. You cannot have a code of ethics further than to say that an engineer should treat a brother engineer as one gentleman treats another. I said ours is not a profession, and I stand before the largest representation of civil engineers in this country to make that statement. Why are we not a profession? Is there any profession that occupies the position we do, the majority, as individuals? You cannot have a true profession and a code of ethics where the most of us are salaried men and occupying positions entirely devoting our time to one division. There is a distinction that we must recognize. We are not doing—the majority are not doing—professional work. No man has the interest of his profession more at heart than I, but we must look it squarely in the face. This is one great difficulty in establishing a code of ethics. I do not believe you can establish a code of ethics for a civil engineer, further than that we should treat each other as one gentleman should treat another. I have read the papers carefully. The gentleman distinctly states that they cannot be formulated; he lays down certain principles and says they cannot be formulated. They cannot be. As to the other articles in one of these journals, I will say, if the laws formulated in that journal were in force, the best members of our profession have been acting dishonestly from the beginning of their professional career. I have violated those rules for the last ten years, and yet I don't think anybody is prepared to get up and say that I have done a dishonorable act in my career. You cannot put them down in cold black and white. I am perfectly willing to vote for this resolution, but I want to say that I do it with the belief that it will probably bring forth nothing of value.

Mr. R. L. HARRIS.—I have given a great deal of attention to this matter and must agree with Mr. Cooper. The engineer's trade is such that if you take the bulk of the engineers of this country, they are not in this Society; they have scattered themselves in isolated places. The only code of ethics that I can think of that could be applied is the old one, to do unto others as you would that they should do unto you. Any other rule, I think, would only be a source of trouble.

The PRESIDENT.—Are there any other remarks to be made on this resolution?

Mr. HERSCHEL.—I would like to add that the Committee make any other recommendation that suggests itself to it. If it is not continued, of course we want that Committee to consider the subject exhaustively and make recommendations to this Society. This is a subject that is of interest to this and such other engineering societies as travel the same path, therefore I would like to have that added to the resolution—that the Committee shall make such other recommendations as to it seems fit.

The PRESIDENT.—If Mr. Read accepts that it will be added.

Mr. CHARLES B. BRUSH.—Is not this subject divided naturally into two parts; first, to obtain a fund of information necessary in order to authorize an attempt to formulate a code of ethics. After this is determined, and assuming it is determined to be advisable, then to proceed with the information that we have and with the discussion that we have, to attempt to formulate that code and provide for that court.

The PRESIDENT.—Mr. Brush, the Chair would interrupt you, it being twelve o'clock, to declare the ballot is now closed. Please proceed.

Mr. BRUSH.—It seems to me that this resolution had that in mind. The first point was properly to obtain information, to look into the matter and report. Second, to formulate a code. It seems to me there is no need of passing the second resolution at the present time. We have first got to know a great deal more than we do now in relation to the matter and have got to consider it a great deal more. It seems to me it would be far better for this Committee simply to report in relation to the whole matter and, when it is advisable, to present such information as they have been able to obtain on the matter, what is the code of ethics of the medical professio~, etc., and what the code of ethics of the theologians is. I think when we come to get exact facts we will find something very different from the sentiment which seems to prevail in the minds of a good many people. Let us consider this matter first and then it will be time enough to attempt to do one of the most delicate things this Society has ever attempted to do, the formulation of a code of ethics and the establishment of a court of ethics. Before we take such steps I think it would be far better for the Committee to give us such information as they can obtain, instead of going instantly to work to do something, or to determine something.

Mr. COOPER.—If you will offer such an amendment I will second it.

Mr. BOGART.—Will the Secretary read that resolution once more; it seems to me a very simple matter.

The Secretary read the resolution.

Mr. HERSCHEL.—Make such other recommendations as the Committee thinks desirable.

Mr. READ.—I think that was the intention, that the gentlemen of

this Committee should report, if they thought it advisable, and that the matter should then be taken up by the Society.

The PRESIDENT.—It appears to the Chair that this is an engineering subject of the utmost importance and that, being such, the action that is required under the Constitution is a reference to the Board of Direction to consider whether such a committee should be appointed. Under Section 13 of Article 6, "Special committees to report upon engineering subjects shall be authorized only by a majority of the votes cast by the Society and in the following manner: A proposition to appoint such a committee shall be presented at a regular meeting of the Society, and, if sustained, on a motion to refer the same to the Board of Direction, by an affirmative vote of not less than 25 corporate members, it shall be so referred."

The Chair deems this resolution to come under that head of important engineering subjects, and, therefore, the resolution will take the shape of a reference to the Board of Direction.

Mr. BOGART.—Well, but it can be amended here before it takes that shape.

The PRESIDENT.—It can be put in any shape that is acceptable to the Society before being so referred.

Mr. HERSCHEL.—It seems to me that this is a subject that should be thoughtfully treated and put in a position that cannot be disputed. I should be very glad to make a motion in line with the suggestion of the Chair, that the Board of Direction consider this whole subject, but when it reports, Mr. President, I would like to have it entirely untrammeled in the amount and quality of what it will present to the Society. How can this Society, or how can any committee of it, or of the governing board, judge advisedly of a code of ethics without they have some code to go by under examination? The proof of the pudding is the eating of it. We cannot take up in the abstract codes of ethics, or points of ethics. We must first acquire some definite knowledge of what this thing means; whether it is good for us to have. The only way that it can be brought to the attention of the members is by a sample code; not one necessarily that is recommended for adoption, but the first rough draft for argument, for discussion, for examination. My motion would be, if it is to be changed——Do I understand there is no motion now before the house?

The PRESIDENT.—The motion now, as the Chair understands it, is that the motion made by Mr. Read be adopted. If the Chair is correct in his view of what that motion means, the only question that can come up upon it, under the Constitution, is its reference to the Board of Direction. This is the appointment of a committee on an important engineering subject, and as such it must first be referred to the Board of Direction, provided there is a sufficiently large vote here to so refer it. The Board is then required by the Constitution to consider the

subject and report its recommendations to the Society at the next general business meeting, together with a statement of the arguments for and against the appointment of such a committee. The Constitution says :

"If a motion for the issue of a letter ballot thereon receive the affirmative vote of two-thirds of the Corporate Members present, the Board of Direction shall within thirty days thereafter issue the letter ballot, accompanied by a statement of the arguments for and against the proposition.

"A majority of a total vote of not less than one-third of the corporate membership of the Society shall be necessary for its adoption, whereupon the committee so authorized shall be appointed by the Board of Direction."

That is the method laid down by the Constitution for the appointment of special committees, for the very purpose of preventing hasty action at a meeting of this sort, and giving a committee certain duties to perform which with more consideration would perhaps not have been assigned to them. Unless the Chair is wrong, and he does not think that he is wrong, the only motion that can come up on this resolution after it is put in the shape that is agreeable to the Society—the only question can be upon its reference to the Board of Direction.

Mr. BRUSH.—Mr. Chairman, a resolution has been presented to the Society ; I have offered an amendment to that resolution which has been seconded. The amendment that I offered to the original resolution was as follows :

"*Resolved*, That a special committee be appointed to collect information and to consider the propriety of the adoption by the Society of a code of ethics for the profession, and to make such other recommendations as the committee thinks proper."

Mr. FITZGERALD.—I move a further amendment, if the gentlemen will allow me to do so. I move the following amendment to Mr. Brush's amendment.

The PRESIDENT.—The Chair believes he is right in saying that Mr. Brush's is the second amendment ; there was a previous amendment.

Mr. BRUSH.—I thought that was withdrawn. My motion was made before Mr. Herschel's.

Mr. FITZGERALD.—I move the following amendment to Mr. Brush's amendment, that this special committee, presuming that a special committee be appointed, is to collect information and consider the propriety of the adoption of the code of ethics, and that if such committee finds it desirable that a code of ethics be adopted, that it shall report to the Society a draft of a code of ethics, and make such other recommendations as the special committee sees fit.

Mr. BRUSH.—I do not accept the amendment. I want first to consider whether a code shall be adopted.

Mr. FITZGERALD.—I understand Mr. Brush's position exactly and I supposed he would not accept the amendment.

The PRESIDENT.—The question comes first on the amendment to the amendment.

General G. S. GREENE.—This Society, gentlemen, I conceive, is organized for the promotion of engineering science. We have nothing to do with ethics nor with our members in relation to them. If a member violates his agreement with the Society he can be expelled.

If this is not an engineering subject we have nothing to do with it; if it is one, it is to be referred to the Board. But I cannot conceive that we have anything to do with a code of ethics.

Mr. FITZGERALD.—Then, if I understand the position correctly, this Society, as a society, has no power to appoint a committee for any purpose whatever, without sending it to the Board of Direction.

Gen. GREENE.—That is the position.

Mr. FITZGERALD.—I beg, with the greatest respect to General Greene's opinion on all matters, to differ from that. I believe that the very fact that this article was so framed in the Constitution, that any matter relating to engineering should go through this course limits it to engineering subjects. I cannot quite see why this is an engineering subject; it seems to me more a matter of government. But still I am willing to coincide with the position of the Chair, but I do think that before we can decide upon the propriety of a code of ethics, we should have some kind of a code of ethics here as an argument to debate upon. If this Committee is to do any work, if it comes to the conclusion that it is advisable for this Society to adopt a code of ethics, then we should have a concrete code of ethics for discussion.

Mr. COOPER.—I consider that Mr. FitzGerald's amendment is unnecessary from the very wording of this amendment of Mr. Brush's "to make such other recommendations as may be desirable." If the Committee comes to the conclusion to have a code of ethics, it is at perfect liberty to report it; it seems to me that covers everything.

Mr. FITZGERALD.—Then, if that covers it, why is the gentleman unwilling that my amendment should go in.

Mr. COOPER.—Because it is unnecessary. You are instructing the Committee; we do not.

Mr. FITZGERALD.—I wish it to present a code of ethics if it finds it desirable that the Society should adopt a code of ethics. I don't want it to say that it was not required or asked by the Society to present a code of ethics.

A MEMBER.—Question, question.

The PRESIDENT.—The question comes up upon the amendment to the amendment—Mr. FitzGerald's amendment to the amendment.

Mr. FITZGERALD.—Is it clearly understood what my amendment is?

The PRESIDENT.—Mr. Secretary, have you the amendment to the amendment?

The SECRETARY.—I have not seen it yet.

The PRESIDENT.—Mr. FitzGerald, please reduce it to writing.

I see Past President Worthen is here; it is his duty to take a place upon the platform, the Society expects it.

The amendment to the amendment is "If the Special Committee finds it desirable that some code of ethics should be adopted by the American Society of Civil Engineers, it will report a form for a code of ethics."

This is to be inserted so that the resolution as amended by the amendment will read :

"*Resolved*, That a Special Committee be appointed to collect information and consider the propriety of the adoption by the Society of a code of ethics." Then insert the amendment: "If the Committee finds it desirable that a code of ethics be adopted, it shall report to the Society a form for a code of ethics."

Then the original resolution goes on, "and make such other recommendations as the Committee sees fit."

A MEMBER.—Is that the original motion of Mr. Read ?

The PRESIDENT.—The amendment, if adopted, will make the whole resolution read as the Secretary has now just read it.

Mr. FRANCIS.—Is not that the original resolution of Mr. Read ?

Mr. FITZGERALD.—I made my amendment in order that it might be brought before the Society. I think the original resolution, as the gentleman suggested, covers the ground; but for the purpose of bringing this before the Society at this time, and that we might vote on whether we should have some kind of a draft, I made my motion.

The PRESIDENT.—The Chair will rule that if the amendment to the amendment is simply the original resolution, the Chair must decide that the amendment is not in order. It will be sufficient to vote down the amendment to the original resolution to effect the same result, and will save time to the meeting. The Chair will declare the amendment to the amendment not in order. The question comes up on the amendment.

Mr. FITZGERALD.—Is not my amendment to the amendment in different form to the original resolution ? If so, in a parliamentary sense, is it not perfectly in order ?

The PRESIDENT.—The gentleman said only a moment ago, that he, himself, recognized that it was equivalent to the original resolution, and therefore he made it ; that makes it clearly out of order. The question is on the amendment to the original resolution. The Secretary will please read it, and the question will be on the amendment.

Mr. HERSCHEL.—I rise to a point of order. The so-called amendment is a substitution ; it is not an amendment at all ; it is substituting a new motion.

Mr. BRUSH.—I rise to a point of order and answer, it is not a substitution.

The PRESIDENT.—The Chair must decide the point of order. It has not been cited as a substitute, but as an amendment. If it is a substitute, the Chair would declare that it has precedence of the amendment; so, in either view, the question comes up on the amendment.

Mr. COOPER.—Read the amendment of Mr. Brush, please.

A MEMBER.—Please read the original motion.

Mr. COOPER.—That is not under discussion.

The PRESIDENT.—The original resolution, of which this is an amendment, should be read when called for; please read the original resolution.

The Secretary read the original resolution.

The PRESIDENT.—The question comes up on the amendment. Those in favor, etc. The noes appear to have it. The noes have it; the amendment is lost.

The question now comes up on the adoption of the original resolution. The question will be upon the reference of the original resolution to the Board of Direction. Those in favor of such reference will please rise and stand until they are counted. * * * * * * Those opposed to such reference to the Board of Direction will please rise and stand until they are counted.

The reference is carried by a vote of 52 in the affirmative to 8 in the negative.

Is the Committee on Standard Rail Sections ready to report?

Mr. R. W. HUNT.—I am directed by the Chairman of the Committee, Mr. Bouscaren, to report to the Society that we have agreed upon our report. Some of the data, as you probably know, have involved a great deal of correspondence with the chief engineers of almost all the railroads of the United States. The results are in the hands of the Secretary of the Society, but our conclusion came too late to be presented at this meeting; the data would not be in a proper condition to be intelligently discussed by the Society, therefore we would ask to be allowed to present it at the next monthly meeting of the Society.

The PRESIDENT.—Does the gentleman make any motion with reference to the continuance or discharge of the Committee?

Mr. HUNT.—Would it be impossible that that Committee be discharged at that time? I think until the report has actually been received by the Society that the Committee should not go out of existence.

Mr. BRUSH.—I move that the report be received and the Committee continued. (Carried.)

The PRESIDENT.—The Chair understands that the Committee on Impurities of Domestic Water Supply has prepared a report. Is any member of the Committee here?

Mr. FITZGERALD.—I am a member of that Committee and have signed the report. I don't know why it is not here. The substance of

the report is that we have tried to find out whether it is desirable for the American Society of Civil Engineers to do something in this matter, and we have come to the conclusion that it is not, and we respectfully ask to be discharged.

The PRESIDENT.—I suppose, under the Constitution, it will be better simply to report progress, and let the final report come in at some other time.

Mr. FITZGERALD.—I think the report ought to be here.

Mr. BOGART.—If somebody would telephone down to Mr. Fteley, the report might be brought up by a messenger.

Mr. FITZGERALD.—How late is this meeting open for business of this nature?

The PRESIDENT.—Until it adjourns. The Secretary has a communication from a member which might as well be presented now. The Society can say whether it desires to entertain the subject.

The SECRETARY.—The communication is from Mr. J. A. L. Waddell, and is as follows:

KANSAS CITY, MO., January 3d, 1893.

To the Members of the American Society of Civil Engineers present at the Annual Meeting, 1893:

GENTLEMEN,—Mr. H. F. J. Porter, Member of the American Society of Mechanical Engineers, has requested me to bring to your notice a paper of his, entitled, "How Can the Present Status of the Engineering Profession be Improved?"

This paper has been presented to the American Society of Mechanical Engineers, and is to be presented also to the Mining and Electrical Engineering Societies, in the expectation that some action will be taken by them on the matter considered.

The subject that Mr. Porter treats is, in my opinion, a most important one, and I think that our Society would do well to give it a thorough discussion and aid Mr. Porter in his worthy undertaking.

I enclose three copies of Mr. Porter's paper.

Very respectfully yours,

J. A. L. WADDELL.

Mr. BOGART.—I move it be referred to the Committee on Ethics that has been authorized, if such committee is appointed.

The PRESIDENT.—You have heard the motion.

Mr. FITZGERALD.—Is it possible to refer a thing to a committee that has not been appointed.

Mr. BOGART.—I said, if appointed.

The PRESIDENT.—Gentlemen, you have heard the motion. It is one of reference to a committee, the appointment of which is dependent upon the future action of the Society after that of the Board of Direc-

tion. If that committee be not appointed, then the reference, of course, is entirely lost.

Mr. BOGART.—Lays it upon the table.

The PRESIDENT.—Yes, lays it upon the table. Those in favor of the motion please say aye. (Carried.)

Gentlemen, is there are any miscellaneous business to come before the Society? Has any one present any matter to present? If so, we have some little time that we can dispose of. I understand the Tellers will probably be ready to report within the next fifteen minutes.

A MEMBER.—Is it possible for the President to announce what the excursions will be to-morrow?

The PRESIDENT.—Mr. C. W. Hunt is the Chairman of the Committee in charge of arrangements.

Mr. CHARLES WARREN HUNT.—The programme, as printed and distributed, will be carried out to the letter, unless the ice in the rivers should prevent, and of this the Committee has no apprehension.

The PRESIDENT.—I am told that Mr. Fteley, the Chairman of the Committee on Public Water Supply, is announced to be here presently; and a little delay will probably conclude that business.

Mr. BRUSH.—Mr. President, we have proceeded so rapidly this morning with our regular business that we have succeeded in transacting all the regular business that usually comes before the meeting in two hours instead of six. It is now half-past one; after action has been taken on the report of the committee on Impurities of Water Supply and the Tellers' report, as far as I know, there is no regular business to come before the meeting, and there will be no need of an afternoon session. This is very desirable if it can be done, because it will enable the Board of Direction, which as you know is now very large, to meet this afternoon and get through with its meeting, instead of meeting on Thursday evening and thus be prevented from attending the reception in the evening. It has always been a very awkward thing, that meeting of the Board of Direction on Thursday. We have now only two matters of business to attend to, the report of the Tellers and Mr. Fteley's report. If any members have anything to bring before the Society, this is the time to do it; or we can take an informal recess.

The PRESIDENT.—Mr. Fteley is on his way.

Mr. BRUSH.—You have done your work so well that this report is all the business that is to come before the meeting, unless some other business is brought before it.

The PRESIDENT.—I notice that the Chairman of the Committee on the Impurities of Public Water Supply is here; is he ready to report?

Mr. A. FTELEY.—Mr. President, I understand that my name was called. I want to say that I was very diligently trying to get together

the members of this Committee to sign it after a certain modification had been introduced.

Mr. Fteley then read the report (see page 43).

The PRESIDENT.—Gentlemen, you have heard the report of the Committee; what is your pleasure in regard to it?

Mr. BRUSH.—I move that the report be received and the Committee discharged.

I want to say that the report, in my judgment, is an admirable one. The subject is one of the most intense interest. The report covers the whole ground. It shows how impracticable it is for any one committee to handle that subject, and is very satisfactory, showing, as it does, the condition of the subject at the present time, and that it is undesirable for a committee of this Society to attempt to handle it in the way that was proposed in 1889.

The PRESIDENT.—Before putting the question, the Chair submits a question which has been sent in by the Tellers for decision as to the validity of a ballot. The ballot is irregular in that it votes for the same person for two offices. His name occurs twice, for one office and for another office. The Chair decides that the ballot is invalid unless the Society takes some other course.

Now, the question comes up on the motion for the acceptance of the report and that the Committee be discharged. (Carried.)

The report is received with the thanks of the Society and the Committee discharged.

How long, Mr. Hunt, before the Tellers will be ready to report?

Mr. C. W. HUNT.—They are now writing out their report.

The PRESIDENT.—In the meantime, if anyone has anything to present, we would be glad to hear it.

The Chair would again call for the report from the Committee on "Uniform Methods of Testing Materials used in Metallic Structures and on the Requirements for these Materials to Further Improve the Grade of Such Structures," from which there has been no report.

It has been usual at this meeting to submit to the Society a decision of the question as to the place for holding the next Annual Convention. In view of the Columbian Exhibition at Chicago next year and of the fact that the Society, through its Board of Direction, as reported to the Society, has accepted the charge of Division A of the World's Congress on Engineering Subjects, which will occur at Chicago about the first of August, the Board decided that that should be the place for holding the next summer's Convention, and the report to that effect is made to the Society so that it should be informed of it at this meeting.

Mr. FITZGERALD.—Has the time been decided on, Mr. President?

The PRESIDENT.—The time is said to have been fixed by the Committee in charge of the Congress at Chicago, which has fixed it for the

last day of July. I suppose a little modification of their plans would affect us without great inconvenience.

The SECRETARY.—I would say that the Executive Committee in Chicago has sent out a printed programme announcing that this Congress will be held at Chicago, beginning on the 31st of July and ending on the 5th of August. I can hardly conceive that it can be changed now, sir.

Mr. BRUSH.—Mr. Chairman, in order to have the record straight, the Constitution provides that the Convention of the Society, for the reading and discussion of professional papers and for social intercourse, shall be held annually at such time and place as the Society may determine. Now, the Society is here and it is the business of the Society to determine where the Convention shall be held. I therefore move that the Annual Convention be held at Chicago next summer. If that is carried, the Society will have decided where it is to be held. It is understood to be the last day in July and the first week in August.

The PRESIDENT.—Is that motion seconded? (Seconded.)

Gentlemen, you have heard the motion; those in favor please say aye. (Carried.)

The Society fixes Chicago as the place, and the time such as may be determined finally by the Committee in charge of such matters for the the Convention at Chicago for next summer.

If any one has anything to bring before the Society, now is a good opportunity. It is proposed, instead of holding a session this afternoon and then receiving the announcement of the Tellers and the result of the election, that the Annual Meeting will adjourn, so that now is the chance if any one has anything to say.

Mr. BRUSH.—Mr. Chairman, I think we may justly consider one matter about which the Society at large is not well informed. The Chicago people—I use that term for short—the people who have the matter in charge at Chicago have asked the Society to take charge of the Civil Engineering branch. The Society has accepted the charge, as has been stated by the report of the Board of Direction, which I wish you would carefully read. It is a very carefully prepared report, especially in relation to that matter, with the understanding that they will endeavor to collect papers and have those papers properly presented and classified at that Convention. The Board of Direction has sent out these circulars and communicated to all the prominent engineering societies that are known in the world, and the promise has been received that 91 papers will be presented. Some of these papers are from the very highest authorities in our profession, not only in this country, but in foreign countries. Now, a great many of these papers will be in foreign languages, and any assistance or suggestion to the Board in regard to translating those papers will be thankfully received. The Society is not committed to the printing of these papers by its accept-

ance of them, nor even to the translation of them, but they will, of course, have to be translated in order to form an idea of their value; the intimation was that this cost would be sustained by the World's Fair people if they thought it was desirable. Or we can adopt them as Minutes of our Convention, if we think it desirable to do so. I wish to call your attention, however, to the fact that 90 papers is a very large number; it is more, perhaps, than the amount we have published in a year, and we might be embarrassed by the superfluity of riches. Any suggestion in relation to the matter at all would be very thankfully received, especially any suggestion in regard to the translation, if there are any facilities which any members can think of.

Mr. J. FOSTER FLAGG.—In what languages would they be?

Mr. BRUSH.—Every language of the world. Then there is another matter. A great many people will pass through the city. The Society rooms are to be kept open and our professional brethren made welcome. Of course, it is important that points of interest that can be visited by these people should be accessible, and if all our members connected with points of interest, either directly or indirectly, who can afford facilities to these visitors, will notify the Secretary that they can see the works and examine the plants with which they are connected, it will be of great assistance. We ought to be informed now so as to be ready for them.

Mr. HERSCHEL.—As regards the remarks of Mr. Brush about translating papers, my suggestion would be that the Secretary call for volunteers to translate papers and that most of them would be translated. There is nothing like leading off with a good example, so if there are any hydraulic papers, either in French or German, I will do one or two myself. If this is to be done by the Committee in Chicago, at so much a page, it would not be valuable after it was done; it takes an engineer to translate an engineering paper.

The SECRETARY.—Is there any one here who can translate Italian? I expect several papers in Italian.

Mr. CROWELL.—If there are any real easy ones in Spanish I can undertake a few.

Mr. FITZGERALD.—If there are any short, easy ones on water supply I should be glad to tackle them.

The SECRETARY.—Is there anybody here who can translate Russian, etc., etc.?

Mr. FTELEY.—The gentleman stated that a very large number of individuals who come over will use our rooms; may I ask whether that is based on facts or merely beliefs?

Mr. BRUSH.—I did not quite understand the statement, whether the Board knows that a very large number of engineers will use our rooms? The information that the Board has received has been that the engineers, as they pass through the city, will stop at our rooms. I

understand that provisions have been made by the Mechanical Engineers and others.

Mr. FTELEY.—The reason I ask the question is this, that this Society has a Committee which was originally charged with looking into that very question, and the President was a member of that Committee. The Committee has sent circulars to all the foreign societies, taking the address of all of them from our Chicago friends, and I simply want to inform the Board that until now there are 3 600 invitations sent out, two or three months have gone and we have only eight answers. If this fact can throw any light on the subject as far as the Board is concerned, I wanted to state the fact.

The PRESIDENT.—The Chair would state that having been appointed a member of a General Committee to confer with the other National Engineering Societies, so called, in regard to the arrangements for the reception of the visitors, the Committee realized that whatever was done jointly was to be paid for jointly, and as it might be more or less embarrassing to assume arrangements of which you would not know the final result, the determination was reached—and it was reported to the Board and the Board recommended—that this Society would simply join with the other societies in notifying the visitors that they would be made welcome here at the respective houses of the so-called national societies and such facilities offered them as may be possible, thereby keeping the whole thing under the control of the Society. That is all that has been done. Those were not invitations that were sent out to the various societies at home and abroad; they were notices. So far as I know, this Society has invited no one.

Mr. BRUSH.—In reply to the suggestion that I made, our friend Mr. Herschel has come to me and stated that the East Jersey Water Works would be one point of interest. It was just such a thing as this I wanted to call out. These works are of very decided interest and there are some very important and very interesting points connected with them. If Mr. Herschel would furnish the Secretary a short statement of those works, calling attention to the fact that it is the largest steel-pipe works in existence and giving special points of interest, showing when it was put into use, what it is doing, the area supplied, etc., and how to get to the points of interest, the whole being in a comparatively short space, it could be then prepared and printed and be ready for distribution to people when they came. If all the rest of us would do the same thing it would aid greatly; simply sending in brief statements in relation to points of interest would save an immense amount of trouble. An enormous amount of work will be thrown upon the Society and the members can aid greatly, just as in this matter of translation; we ought to be able to make our own translations. If members will furnish the information as to points of interest, it will save a great deal of labor and correspondence.

The SECRETARY.—I would like to emphasize just one point in Mr. Brush's remarks, that is, state clearly how these points of interest may be reached.

Mr. C. W. HUNT.—I move that the meeting adjourn for conversation for five minutes, or until the report of the Tellers is finished. (Carried.)

RECESS.

The PRESIDENT.—The Society will please come to order. Gentlement, the report of the Tellers will now be announced.

The Secretary read the report of the Tellers as follows:

Total number of ballots received		443
Not entitled to a vote	1	
Without signature	7	
Informal	1	9
Total number counted		434

For President: William Metcalf, 433; Henry G. Morse, 1.

For Vice-President: Elmer L. Corthell, 427; Charles Macdonald, 432; Virgil G. Bogue, 1; George W. McNulty, 1; Cyrus B. Comstock, 1; William Sooy Smith, 1; Alfred Noble, 1; Cady Staley, 1.

For Directors: Henry G. Prout, 433; Willard S. Pope, 432; Olin H. Landreth, 432; Foster Crowell, 432; Frederic P. Stearns, 431; John T. Fanning, 382; Joseph P. Frizell, 7; Horace E. Stevens, 3; A. Bonzano, 3; Alfred Noble, 2; John F. Ward, 2; Lewis Kingman, 2; Jacob Blickensderfer, 1; Edward P. North, 1; Geo. Y. Wisner, 1; Chas. F. Loweth, 1; W. C. Wetherill, 1; J. Nelson Tubbs, 1; Louis J. Le Conte, 1; Mansfield Merriman, 1; Desmond FitzGerald, 1; Roswell E. Briggs, 1; Marshall M. Tidd, 1; Theodore Cooper, 1; Herbert L. Hudson, 1; Elbert Nexsen, 1; Chas. Paine, 1; James Dun, 1.

For Secretary: Francis Collingwood, 431; John Bogart, 1; Edward P. North, 1.

For Treasurer: John Bogart, 419; Edward P. North, 2; Geo. Just, 1; Wm. B. Parsons, 1; Thos. C. Clarke, 1; Arthur M. Wellington, 1; Chas. H. Myers, 1.

HENRY B. SEAMAN,
CHAS. W. GAY,
ALVA M. VAN AUKEN,
Tellers.

The PRESIDENT.—The result of the election is that the following gentlemen are duly elected: As President, Mr. William Metcalf; as Vice-Presidents, Elmer L. Corthell and Charles Macdonald; as Di-

rectors, Henry G. Prout, Willard S. Pope, Olin H. Landreth, Foster Crowell, Frederic P. Stearns and John T. Fanning; as Secretary, Francis Collingwood; as Treasurer, John Bogart.

Mr. NORTH.—Mr. President, would it not be well for the Secretary to notify Mr. Metcalf; he is now at the Society House.

The PRESIDENT.—It has been suggested that Mr. Metcalf be notified of his election. If it be done it had better be done by a committee.

Mr. NORTH.—I would suggest the Secretary.

The PRESIDENT.—The Secretary cannot leave his post.

Mr. NORTH.—I would suggest a committee only, I don't care to go on it as chairman.

The PRESIDENT.—What is the motion, sir?

Mr. NORTH.—That the Secretary notify the President of his election.

A MEMBER.—I move we adjourn.

The PRESIDENT.—The Secretary will duly notify the President-elect of his election; that I am sure he will do.

Mr. HERSCHEL.—I move that the President appoint a committee to notify Mr. Metcalf, who, we understand, is in the Society House (Seconded and carried.)

The Chair would appoint Mr. North and Mr. Herschel.

Messrs. North and Herschel conducted Mr. Metcalf to the platform.

The PRESIDENT.—Gentlemen, you all know and recognize Mr. Metcalf, the President-elect of the Society.

Mr. WILLIAM METCALF.—Mr. President, gentlemen, just having come in from a four days' railroad ride, I can hardly be expected to be prepared for much of a speech. I can only say that I appreciate the honor more than I can express, and the only fear I have is the fear that you may be disappointed in me before the year is over, but whatever I can do to help maintain the dignity and character of the Society and help along in its work, I will try my best to do. I thank you all for your kindness and your courtesy.

The PRESIDENT.—Gentlemen, a motion to adjourn is in order.

The SECRETARY.—It is necessary that a meeting of the Board of Direction be held, in accordance with the Constitution. It was supposed that we would not get through so early, and that it could not be held until half-past four o'clock; the business has been so promptly transacted that that meeting can be held at 3.30.

The PRESIDENT.—That means the new members of the Board, as well as those who hold over.

Adjourned.

JANUARY 18TH, EVENING SESSION.—William D. Kelley, M. Am. Soc. C. E., entertained the Society with a very interesting description of

his work on the survey of the proposed Intercontinental Railway from the United States to the Argentine Republic. Mr. Kelley's description related to that part of the line in Ecuador and Peru, from Quito to Cuzco, through which he ran a stadia line 1 700 miles in length, and was illustrated by stereopticon views.

THURSDAY, JANUARY 19TH, was devoted to an excursion. The party proceeded by steamer and the Tenth Avenue Cable Road to the One Hundred and Fifty-fifth Street Viaduct and the Seventh Avenue Drawbridge now under construction by the city.

After inspection of this interesting work, the party proceeded to the works of the De La Vergne Refrigerating Machine Company at Port Morris, and two hours were spent pleasantly and profitably in an inspection of this very complete plant.

In the evening a reception for gentlemen, tendered by the resident membership to the visiting members and to other guests, was held and was very largely attended.

The members of the Society of the various classes, 211 in number, present at the Annual Meeting, excursions, etc., were: Henry C. Allen, Thomas W. Allen, James C. Anderson, P. C. Asserson, William A. Aycrigg, John W. Bacon, Charles J. Bates, George Baum, William Henry Baldwin, Arthur Beardsley, Leonard F. Beckwith, John A. Bensel, George H. Benzenberg, George H. Bishop, H. Bissell, William Murray Black, George H. Blakeley, John Bogart, Alfred P. Boller, Charles P. Bonnett, Louis B. Bonnett, Adolphus Bonzano, William F. Booth, John B. Bott, A. L. Bowman, C. W. Bradley, W. H. Breithaupt, J. Breuchaud, P. F. Brendlinger, A. G. Brinckerhoff, H. Waller Brinckerhoff, Thomas E. Brown, Jr., Frank Bruen, Charles B. Brush, Andrew Bryson, L. L. Buck, Albert Carr, Robert Cartwright, W. A. Cattell, J. N. Chester, S. H. Chittenden, Thomas C. Clarke, F. H. Clement, Edward B. Codwise, Amory Coffin, Mendes Cohen, Howard J. Cole, F. Collingwood, Silas G. Comfort, Alfred G. Compton, Samuel L. Cooper, Theodore Cooper, George B. Cornell, Horace Crosby, Foster Crowell, A. C. Cunningham, F. S. Curtis, Chandler Davis, Joseph P. Davis, Rob B. Davis, E. P. Dawley, John Sterling Deans, J. E. Denton, S. L. F. Deyo, Stancliff B. Downes, O. Erlandsen, L. P. Evans, John W. Ferguson, Clark Fisher, Desmond FitzGerald, J. Foster Flagg, John D. Fouquet, Louis D. Fouquet, Charles Francis, James Francis, Arthur J. Frith, A. Fteley, Charles W. Gay, Martin Gay, E. H. Goodman, C. S. Gowen, Charles H. Graham, J. Herbert Grant, Thomas H. Grant, William Gray, Bernard R. Green, George Sears Greene, G. S. Greene, Jr., C. R. Grimm, Stephen S. Haight, George R. Hardy, Charles M. Harris, Robert L. Harris, William J. Haskins, Clemens Herschel, R. W. Hildreth, Albert B. Hill, S. Willett Hoag, Jr., Henry W. Hodge, Frank W. Hodgdon, Edward W. Howe, George W. Howell, R. L. Hoxie, Alfred E. Hunt, Charles Warren Hunt, Robert W. Hunt,

William R. Hutton, Gustave Kaufman, Herbert C. Keith, W. D. Kelley, Jr., Cassius W. Kelly, George A. Kimball, C. C. King, Joseph M. Knap, Emil Kuichling, G. Leverich, Augustus W. Locke, Horace Loomis, Thomas D. Lovett, D. Jones Lucas, Charles Macdonald, W. W. Maclay, Henry Manley, C. C. Martin, Thomas H. McCann, James C. McGuire, T. H. McKenzie, C. W. McMeekin, George W. McNulty, William Metcalf, Henry C. Meyer, L. G. Montony, Charles H. Myers, R. Neumeyer, Charles E. Newham, O. F. Nichols, George B. Nicholson, Edward P. North, A. S. Nye, Jr., F. S. Odell, Henry L. Oestreich, John F. O'Rourke, James Owen, A. McC. Parker, W. Barclay Parsons, P. S. Perkins, H. C. Phillips, Albert H. Porter, Henry G. Prout, Robert L. Read, Benjamin Reece, J. V. W. Reynders, Palmer C. Ricketts, Percival Roberts, Jr., William Roberts, John C. L. Rogge, Charles B. Rowland, Thomas F. Rowland, Oscar Saabye, J. Gardner Sanderson, C. C. Schneider, Henry B. Seaman, W. W. Seitzinger, Ira A. Shaler, Charles H. Smith, Merritt H. Smith, Charles H. Snow, E. Gybbon Spilsbury, D. McN. Stauffer, E. C. Stout, Charles F. Stowell, A. A. Stuart, George F. Swain, T. M. R. Talcott, Lucian A. Taylor, W. H. G. Temple, S. C, Thompson, George H. Thomson, John Thomson, T. Kennard Thomson, George C. Tingley, Calvin Tomkins, A. T. Tomlinson, Stevenson Towle. E. E. Russell Tratman, John C. Trautwine, Jr., L. L. Tribus, W. G. Triest, E. K. Turner, Alva M. Van Auken, John G. Van Horne, Edgar B. Van Winkle, Samuel Tobias Wagner, C. I. Walker, John F. Wallace, Charles D. Ward, R. Willard Ware, Frank S. Washburn, Wm. d'H. Washington, F. W. Watkins, Edward Wegmann, Jr., A. M. Wellington, E. B. Weston, Frank O. Whitney, William H. Wiley, F. Stuart Williamson, Paul L. Wölfel, C. J. H. Woodbury, William E. Worthen, Preston K. Yates, and H. W. York.

Meetings of the Board of Direction.

January 3d, 1893.—Action was taken in regard to members in arrears for dues. The question of a plan for effecting the selection of the Nominating Committee was discussed and a report adopted for presentation to the Annual Meeting. Applications were considered and routine business transacted.

January 16th, 1893.—The Annual Report of the Board was adopted. A report on the advisability of changing the badge of the Society was adopted for presentation to the Annual Meeting.

January 18th, 1893.—Standing committees were appointed. The subject of arrangements for the accommodation of the Society at Chicago, and of a plan for the proper reception of foreign engineers at the house of the Society on their way to Chicago were discussed.

January 31st, 1893.—A form of circular to be sent to all members asking for volunteers to translate foreign papers was adopted. Applications were considered. Three Associates and four Juniors were elected.

APPENDIX.

REPORT OF THE BOARD OF DIRECTION FOR THE YEAR ENDING DECEMBER 31st, 1892.

PRESENTED AT THE ANNUAL MEETING, JANUARY 18TH, 1893.

The Board of Direction, in compliance with the provisions of the Constitution of the Society, presents its Report for the year ending December 31st, 1892.

MEMBERSHIP.

The changes in membership are fully shown in the following table:

	JAN 1, 1892.			JAN. 1, 1893.			LOSSES.				ADDITIONS.		TOTALS.	
	Resident.	Non-Resident.	Total	Resident.	Non-Resident.	Total.	By Transfer.	By Resignation.	Dropped.	By Death.	Transfer.	Election.	Loss.	Gain.
Hon. M.....	4	1	5	6	2	8	....	....	....	1	*2	2	1	4
Cor. M.....	.....	3	3	.....	3	3	....	....	....	....	....	....	....	....
M.....	190	918	1 108	194	940	1 134	2	2	6	12	13	45	22	48
Assoc. M.....	9	40	49	20	89	109	....	....	....	....	‡19	41	....	60
Associates...	19	44	63	22	47	69	1	1	....	....	§1	7	2	8
Juniors.....	59	162	221	74	164	238	23	2	3	2	1	46	30	46
Fellows.....	16	33	49	14	34	48	....	....	....	2	....	1	2	1
Subscribers..	8	30	38	8	27	35	....	....	....	3	....	....	3	....
Totals....	305	1231	1 536	338	1 306	1 644	26	5	9	20	26	142	60	168

* Members. † 1 Associate and 2 Juniors. ‡ All Juniors. § Junior.

It will be seen from the table that the net increase in the membership during the past year has been 108. The Board has continued to require a rigid fulfillment of the conditions of the Constitution in regard to applicants for membership.

Applications for membership have been acted upon by the Board during the year as follows:

Passed to Ballot as Member	53	
" " " " Assoc. Member	65	
Elected Honorary Member	4	
" Junior	47	
" Fellow	2	
Total		171
Awaiting action		18

There have been rejected by the Society one candidate for Membership, and one for Associate Member.

The subject of membership cannot be passed without brief mention of the great loss sustained by the Society and the profession at large in the death of two of its Past Presidents during the year.

Past President and Honorary Member James B. Francis was identified with the Society from the date of its incorporation in 1852. His reputation as an engineer was worldwide, and his best thought and judgment in professional matters were freely given, both to individual members and the Society at large. Up to the last he delighted to take part in its meetings, and he will be greatly missed from future gatherings of our members.

Past President William P. Shinn became a member of the Society in 1869, and interested himself most thoroughly in every movement for its advancement; he will long be remembered for his earnestness of purpose, clearness of comprehension, and bold advocacy of whatever he thought to be for the best interests of the Society.

In addition to these the losses by death during the year 1892 have been eleven Members: H. Wadsworth Clarke, George C. Dickinson, John H. Morton, Edward M. Reed, John Whitelaw, Andrew D. Whitton, George F. Wright, Joseph N. DuBarry, H. Stanley Goodwin, Allen B. Hegeman and Robert C. Morris; two Juniors, Elijah P. Butts and Arthur H. Wood; and two Fellows, Sidney Dillon and Frederick O. Norton.

New Constitution.

The enlarged Board of Direction under the New Constitution was elected at the last Annual Meeting. There have been 14 meetings of the Board; the average attendance has been 13; the average attendance of non-resident members has been four (ranging from one to nine), and at no time has the Board lacked a quorum.

The Constitution provides for the appointment of two new officers, an Assistant Secretary and Librarian, and an Auditor.

To the first of these offices, Charles Warren Hunt, M. Am. Soc. C. E., was appointed April 5th, 1892, and entered at once upon his duties.

Thomas B. Lee, who has for many years been Chief Clerk of the Society, was appointed Auditor in March, and has since had entire charge of the accounts of the Society.

Society House.

The Society House has been carefully looked after, and much time and some money has been devoted to improvements which were doubly necessary in anticipation of the needs of 1893.

Library.

A very desirable change has been made in the rooms devoted to the library. The old bookcases in the front room were sold and are now

replaced by continuous shelving; the hanging arch which divided the room was removed. With a fresh coat of paint and the addition of new chandeliers, the whole room is much more comfortable and inviting, and gives a large increase in space for books.

A complete rearrangement of the books in the library has been effected, as well as a careful verification and correction of the card catalogue. The result will be appreciated by those members who have occasion to consult the library. The number of titles now on the shelves is over 16 000, and while it is very difficult to place a valuation on many rare books and manuscripts, some of which could not be replaced, it is believed that if the cash value of the library were placed as one of the assets of the Society, $17 000 would be a very conservative estimate of its worth; it is insured for $15 000. A list of the books sufficiently complete for identification in case of loss by fire has been made, and placed in a Safe Deposit Vault.

The Board reiterates here what has been already said in circulars, that, this being a reference library, it is most desirable that copies of reports of every kind bearing even remotely upon engineering subjects should find a place on its shelves. Every member should feel it a duty to contribute to the library copies of all such reports, whenever possible, and to inform the Secretary of other desirable material which may be obtained. The importance of attention to this request will become increasingly evident in the future. There are yet some sets of Municipal and Railroad Reports which are incomplete and should be filled up. It not infrequently happens that reference is made to this library, after search elsewhere has failed, for information as to the early history of projects or enterprises which have since become important.

No legacies of books have been received during the year, although no better disposition of an engineering library can be made.

The amount expended upon the library has been as follows:

For completing files of periodicals	$ 7 82
" binding 361 volumes	486 20
" new books	74 15
" contingent expenses	44 00
	$612 17

The additions to the library from all sources have been:

Bound volumes	149
Pamphlets	417
Maps	221
Photographs	5
Specifications	301
	1 093

International Congress of Navigation.

The Society was represented at the International Congress on Internal Navigation, held at Paris, July last, by Edward P. North, Estevan A. Fuertes, George H. Ely, William Watson, Cady Staley and Cyrus B. Comstock. The delegation was well received and took an active part in the proceedings. Prof. Fuertes was made First Vice-President of the Economic Section. A full set of the printed proceedings of the Congress has been received and placed in the library.

Engineering Congress, 1893.

The Board has devoted much time to the discussion and arrangement of matters connected with the proposed Engineering Congress to be held at Chicago during the first week in August, under the auspices of the World's Congress Auxiliary. The Executive Committee of the Engineering Societies having decided that this Society should be asked to contribute $3 000 as its proportionate share of the amount needed for the maintenance of suitable rooms as a headquarters at Chicago for visiting engineers, our membership has been called upon for subscriptions and the full sum has been secured and will be paid over as it may be needed.

Early in the year this Society was requested by the General Committee on Engineering Congresses of the World's Congress Auxiliary of the Columbian Exposition to undertake "the work of the organization and management of Division A, Civil Engineering," to be held at Chicago in the summer of 1893.

After proper consideration by the Board of Direction it was determined to accept the duty thus tendered, and to make the Congress the occasion of the Society's Annual Convention.

In accordance with this arrangement, invitations to co-operate in obtaining papers of general interest to the profession have been sent to all the leading engineering societies in this country and abroad. Courteous acknowledgments of these invitations have been made, and enough papers have been promised to make a very full programme for the meeting. Many of those who promise papers have an international reputation, and it is confidently anticipated that the matter presented will be of great value.

There will be a large expense in connection with suitable attentions to foreign engineers at the Society House, in the employment of interpreters and the translation and printing of papers. Such special arrangements as may be found necessary will be made as they are required. The Board has confidence that all the funds needed to enable it to uphold the dignity of the Society, and to do all that may be deemed necessary in this connection, will be forthcoming.

The social reception of visitors from those societies which entertained members of this and other societies in 1889 has been intrusted

to a committee composed of members of this and of the other three National Engineering Societies. Whatever this Joint Committee decides to do is to be accomplished without cost to this Society.

Bulletin.

In the last annual report a recommendation was made by the Library Committee, that a semi-monthly publication be issued containing such information relative to meetings, papers and other matters as had formerly been sent out by circulars, postal cards, etc. The Board of Direction ordered the printing of such a publication, and the first number was issued April 14th. It has since been continued regularly except during two of the summer months.

Publications.

The Publication Committee recommended, and the Board after much discussion adopted, a new policy in relation to the issue of papers in the *Transactions*. Papers are now printed in the *Transactions* as soon as possible after presentation to the Society. Ample time is given after distribution to all members, for discussions, which are subsequently printed.

The object is twofold. 1st, to secure the prompt printing of all papers; 2d, to give every member an opportunity to take part in the discussions.

It has become evident to the Board that many of the members do not sufficiently consider the duty they owe to our profession and to the Society, in presenting papers describing their work. The first of the objects named in the Constitution as a reason for the existence of the Society is "the advancement of engineering knowledge and practice." If these words mean anything, when a person joins the Society it becomes his duty to do his share in this important work; and the Society can never reach its highest usefulness until its members appreciate and act upon this obligation.

There have been printed in the *Transactions* during the year ending January 1st, 1893, 48 papers in 13 monthly numbers, covering 1 678 pages, illustrated by 208 cuts and 168 plates. There has also been published an index to Vol. XXVI. The *Proceedings*, containing minutes of meetings, memoirs, etc., have covered 248 pages.

The Annual List of Members has been improved by the addition of an alphabetical list of the names of members of all grades, which adds much to its value. With the Constitution, the list covers 157 pages.

Two thousand copies of each number of the *Transactions* were printed at the beginning of the year. Since February the number of copies printed has been increased to 2 100, together with the usual author's copies, and extra and advance papers.

In order to supply earlier numbers of the *Transactions* to those

desiring to purchase them, it has been found necessary to reprint 4 numbers containing 270 pages, with 35 plates and 21 cuts.

The total number of pages printed was—

Transactions	1 678
Index and Table of Contents	22
Proceedings	248
Reprints	270
Bulletins	61
Constitution and List of Members	157
Total pages	2 436
Total cuts printed	229
" plates "	203

The cost of publications has been as follows:

For paper, printing and binding *Transactions* and *Proceedings*		$6 213 65
" paper, printing and binding 2 600 Annual List of Members		692 75
" Plates and cuts, drafting, reproducing, printing and inserting		4 687 21
" 14 Bulletins, printing		184 75
" 970 Extra copies of Memoirs		53 44
For 12 385 extra copies of Papers		857 15
" 4 050 advance " "		274 55
" Postage on *Transactions*	$368 89	
" " Bulletin	185 00	553 89
" Reprinting 500 copies of four numbers of *Transactions* and *Proceedings*		447 59
" Clerks' and Stenographer's time charged to publications		1 319 87
" Copyright		41 10
" Sundry expenses charged to publication		44 71
" Commissions on advertisements		413 40
		15 784 06
Deduct—Subscriptions and sales of publications	$2 187 15	
Received for advertisements	1 202 00	3 389 15
		$12 394 91

The Board desires to impress upon the members the importance of promptly notifying the Secretary of the death of any member, and of assisting in the preparation of suitable memoirs. These become in

after years a part of the history of the profession and are too important to be neglected.

Subscribers to the Building Fund.

At its meeting on December 6th, the Board of Direction took action on the question of the continuous publication of the list of subscribers to the Building Fund in the Annual List of Members. It was ordered that in future the names of those who had subscribed but not paid their subscription, be dropped; that the names of all who have subscribed to the Enlargement of the Society House shall hereafter be published as subscribers to the Building Fund, and that this list shall contain only the names of those who have subscribed $100 or more; provided, however, that the names of those whose subscription was less than that sum, but who shall hereafter make up the amount to $100, shall appear in the future lists.

Meetings.

During the year beginning January 1st, 1892, twenty meetings of the Society have been held, one of which was the Annual Meeting held in New York, January 20th and 21st, and one was the Annual Convention held at Fort Monroe; 41 papers have been read and have been discussed orally or in writing by 264 persons.

The Norman Medal for 1891 was awarded to John R. Freeman, M. Am. Soc. C. E., for the paper on "The Nozzle as an Accurate Water Meter."

The Rowland Prize for 1891 was awarded to William H. Burr, M. Am. Soc. C. E., for the paper on "The River Spans of the Cincinnati and Covington Elevated Railway Transfer and Bridge Company."

The reports of the Treasurer, the Auditor, and of the Finance Committee are appended.

By order of the Board of Direction,

F. COLLINGWOOD,
Secretary.

REPORT OF THE TREASURER,

FOR THE YEAR ENDING DECEMBER 31ST, 1892.

Balance on hand December 31st, 1891...	$5 660 58	
Receipts January 1st to December 31st, 1892	34 039 13	
Payments of audited vouchers, January 1st to December 31st, 1892.....		$36 690 97
Balance on hand December 31st, 1892, in bank and Trust Company.....		3 008 74
	$39 699 71	$39 699 71

The securities on hand are as follows:

One Chicago and North-western Railway Bond, 4%, coupon, par value	$1 000
Seven Pennsylvania Railroad General Mortgage Bonds, 6%, registered, par value.....	7 000
Four Pennsylvania Railroad General Mortgage Bonds, 6%, coupon, par value.....	4 000
One Rio Grande Western Railway Bond, 4%, coupon, par value.....	1 000
One Pittsburgh and Western Railway Bond, 4%, coupon, par value	1 000
One Certificate Croton Aqueduct Stock of the City of New York, 7%, registered, par value.....	1 000
Ten Shares Stock Consolidated Gas Company of the City of New York, par value.....	1 000

Respectfully submitted,

JOHN BOGART,
Treasurer.

AMERICAN SOCIETY OF CIVIL ENGINEERS.

REPORT OF THE AUDITOR FOR THE YEAR ENDING DECEMBER 31ST, 1892.

To the Board of Direction of the American Society of Civil Engineers:

GENTLEMEN,—I have the honor to present the following statement of receipts and expenses for the fiscal year of the Society, beginning January 1st, 1892.

RECEIPTS.			DISBURSEMENTS.		
Balance on hand December 31st, 1891		$5 660 58	Interest on Mortgage	$800 00	
Entrance Fees	$3 065 00		Taxes	425 00	
Current Dues	18 475 12		Publications	15 230 17	
Past Dues	943 08		Stationery and Printing	1 278 18	
Dues for year beginning January 1st, 1893	5 476 45		Postage	1 741 67	
Sales of Publications	2 187 15		Library	1 829 92	
Badges	420 00		Salaries of Secretary, Asst. Secretary and Treasurer	6 022 16	
Certificates of Membership	155 55		Convention and Annual Meeting	1 459 05	
Advertisements	1 202 00		Janitor	720 00	
Interest:			House Supplies and Furniture	207 98	
On Pennsylvania R. R. Bond $870 00			Fuel	256 00	
" New York Croton Aqueduct Stock 70 00			Water	17 55	
" Chicago and Northwestern R.R. Bond 50 00			Gas	141 73	
" Consolidated Gas Stock 60 00			Certificates of Membership	81 05	
" Pittsburgh and Western R. R. Bond 20 00			Badges	430 00	
" Rio Grande and Western R. R. Bond 20 00			Insurance	120 00	
" Union Trust Co. Deposit 96 33			Safe Deposit	10 00	
	1 186 33		Norman Medal and Rowland Prize	120 85	
Compounding Dues	575 00		Treasurer's Books and Accounts	450 00	
Fellowship Fees	250 00		Work of Committees	162 60	
Other sources	103 45		Repairs and Betterments, Society House	397 32	
		34 039 13	Other Expenditures	473 89	
			Current Business	2 723 35	
					$35 098 47
			Balance:		
			Investment: One $1 000 Rio Grande Western R. R. Bond, cost	$773 75	
			One $1 000 Pittsburgh and Western R. R. Bond, cost	818 75	
			In Bank and Trust Company	3 008 74	
					4 601 24
		$39 699 71			$39 699 71

The compensation paid to each person in the service of the Society during the past year is stated below, and also the several accounts to which these payments have been distributed by the Finance Committee:

F. Collingwood, Secretary.		
Charged to Salaries		$3 916 63
Charles Warren Hunt, Assistant Secretary and Librarian.		
Charged to Salaries		$1 805 53
John Bogart, Treasurer		$750 00
Charged to Books and Accounts	$450 00	
Salaries	300 00	750 00
Thomas B. Lee, Auditor and Chief Clerk		$1 602 00
Charged to Publications	$395 00	
Current Business	1 051 00	
Annual Meeting and Convention	152 00	
Work of Committees	4 00	1 602 00
M. T. Jefferis, Assistant Librarian		$1 219 00
Charged to Library	$1 201 00	
Current Business	18 00	1 219 00
B. J. Burke, Clerk		$1 040 00
Charged to Publications	$334 50	
Current Business	670 45	
Annual Meeting	35 05	1 040 00
R. J. Dunn, Stenographer and Typewriter		$790 00
Charged to Publications	$145 25	
Annual Meeting	101 50	
Work of Committees	30 25	
Current Business	513 00	790 00
E. G. Crans, Stenographic Reporter		$431 93
Charged to Publications	$233 02	
Work of Committees	31 10	
Convention and Annual Meeting	156 56	
Current Business	11 25	431 93
A. C. Mander, Janitor.		
Charged to Janitor		$720 00

John J. Bower, Office Boy		$177 50
Charged to Publications	$91 00	
Convention and Annual Meeting	2 00	
Current Business	84 50	177 50
Charles H. Beyer, Office Boy		$32 10
Charged to Publications	$8 60	
Convention and Annual Meeting	3 00	
Current Business	20 50	32 10
L. B. Bonnett, Temporary Assistant to Secretary		$237 00
Charged to Publications	$112 50	
Convention and Annual Meeting	60 00	
Current Business	64 50	237 00
Total compensation paid		$12 721 69

DISTRIBUTION OF TOTAL COMPENSATION PAID.

Salaries of Secretary, Assistant Secretary, and Treasurer.	$6 022 16
Treasurer's Books and Accounts	450 00
Library	1 201 00
Publications	1 319 87
Current Business	2 433 20
Annual Meeting and Convention	510 11
Work of Committees	65 35
Janitor	720 00
Total	$12 721 69

The Funds of the Society are as follows:

Fellowship Fund:		
Ninety-six subscriptions to December 31st, 1891		$10 650 00
Premium and accumulated interest, December 31st, 1892		1 388 28
Fund on hand December 31st, 1892		$12 038 28
One subscription received during 1892		250 00
		$12 288 28
Interest received during 1892		805 00
		$13 093 28
Expended for Publications during 1892		805 00
		$12 288 28

The present investment of this Fund is:

Nine Pennsylvania Railroad General Mortgage Bonds, cost	$11 111 82
One Chicago and North-western Railroad Bond, 5%, cost	1 035 00
Part of one Rio Grande Western Railroad Bond, 4%.	141 46
	$12 288 28

Norman Medal Fund:

On Certificate Croton Aqueduct Stock, New York City	$1 000 00

Building Fund:

Receipts previous to December 31st, 1885	$17 842 00

Expended:

For Payment on Purchase of Property	$14 000 00
For Improvement on Property	3,486 97
For Legal Services, Circulars, etc	355 03
	$17 842 00

Fund for Enlarged Building:

Receipts from Subscriptions	$8 029 50
Expended on Enlargement	8 029 50

Rowland Prize Fund:

One Pennsylvania Railroad General Mortgage Bond, Six per cent., cost	$1 222 50

Compounding Fund:

Four payments at $325	$1 300 00
Eight payments at $250	2 000 00
	$3 300 00

The present investment of this Fund is as follows:

One Pennsylvania Railroad General Mortgage Bond, Six per cent., cost	$1 222 50
Ten Shares Consolidated Gas Company of New York, cost	972 50
One Pittsburgh and Western Four per cent., cost	818 75
Part of one Rio Grande Western Railroad Bond, (balance of this Bond in Fellowship Fund)	286 25
	$3 300 00

General Fund:

Part of one Rio Grande Western Railroad Bond (balance of this bond in Fellowship and Compounding Funds)	$346 04
Cash	106 33
	$452 37

Respectfully submitted,

THOMAS B. LEE,
Auditor.

REPORT OF THE COMMITTEE ON FINANCE.

The Finance Committee have the honor to report that they have performed the duty of auditing all the bills which have been paid during the past year, and have found that each bill has been charged to its proper fund, and that the several sums paid have not exceeded the amounts appropriated by the Board of Direction for the purposes specifically mentioned.

They have also seen that the investments, transfers and deposits have been made as detailed in the reports of the Secretary, Treasurer, and Auditor.

In accordance with the provisions of the Constitution the accounts and financial books of the Society have been examined and found correct by an expert accountant.

CHARLES B. BRUSH,
Chairman of Committee on Finance.

Report on Award of Norman Medal, 1891–92.

The Board of Censors appointed to award the Norman Medal for papers published in the Society's *Transactions* during the medal year terminating August 1st, 1892, beg to report that they award the medal to William Starling, M. Am. Soc. C. E., for Paper No. 534, entitled "Some Notes on the Holland Dikes."

Respectfully submitted,

Thos. M. Cleeman.
William Ludlow.
E. Sweet.

Report on Award of Rowland Prize, 1891–92.

The Committee appointed to award the Rowland Prize for Papers published in the Society's *Transactions* during the year ending August 1st, 1892, beg to report that they award the prize to Paper No. 518,

entitled "Red Rock Cantilever Bridge," by Samuel M. Rowe, M. Am. Soc. C. E., Stillman W. Robinson, M. Am. Soc. C. E., and Henry H. Quimby, M. Am. Soc. C. E.

They would also make honorable mention of Paper No. 491, on "Inland Sewage Disposal, with Special Reference to the East Orange, N. J. Works," by C. Ph. Bassett, M. Am. Soc. C. E. Paper No. 492 on "American Irrigation Engineering," by Herbert M. Wilson, M. Am. Soc. C. E., and Paper No. 511, on "The Brazos River Harbor Improvement," by George Y. Wisner, M. Am. Soc. C. E.

Very respectfully,

T. GUILFORD SMITH.
E. THACHER.
F. COLLINGWOOD.

REPORT OF COMMITTEE ON IMPURITIES OF PUBLIC WATER SUPPLY.

To the American Society of Civil Engineers:

GENTLEMEN,—In accordance with the terms of the Constitution of the American Society of Civil Engineers, we beg to submit the following, the Annual Report of your Committee on Impurities of Public Water Supplies.

This Committee was appointed in pursuance of a resolution passed at the Annual Convention of the Society in 1889; so long a time has elapsed since, that it may not be out of place for the better understanding of the following remarks to read the original resolution, and to briefly refer to the reports previously made:

"*Whereas*, It is a well-known fact that many cities and towns on the Atlantic Coast have suffered very greatly from impurities of their water supplies, due to various cases, and that no adequate remedy, meeting all conditions, has been found therefor; and,

"*Whereas*, These impurities are often due to natural causes which have not been adequately investigated on account of the difficulty of centralizing the individual efforts of all parties engaged in said investigations;

"*Resolved*, That a committee of three members of this Society be appointed by the President to ascertain the best means of concentrating all obtainable information in such a manner as to secure useful results, and to report to the Annual Meeting of this Society what further action, in their opinion, should be taken in the premises."

In its first report, at the Annual Meeting of January, 1890, the Committee reviewed the whole question, and stated that any organization, in order to cover the necessary grounds, should be a national one; that inasmuch as there is no national body in existence to take hold of the subject, this Society or any similar body is the proper one to attempt the concentration of information mentioned in the resolution. The Committee stated that one of the first requirements in the case would

be to collect and catalogue the documentary information on the subject now in existence, and Mr. Rafter, one of the members, furnished an elaborate list of the most important publications on the subject.

The report suggested collaboration with the Boards of Health of the different States, with the Medical Bureaus of the General Government, and with other authorities engaged in this line of research, and referred to the excellent work done by the Board of Health of Massachusetts, which is the only one which has "now an equipment and organization for a broad study of the complete questions connected with the salubrity of potable water."

The Committee thought that its instructions did not authorize it to inaugurate a system of correspondence and investigation such as indicated in its report, and asked to be discharged.

The discussion of the report brought out the idea that the Society could not undertake such work as was indicated; that it would require a considerable expenditure for additional assistance and for the collection of documentary information, but it was suggested that the Committee could correspond by circular or otherwise with the various Boards of Health, Water Boards and other bodies interested in maintaining the purity of public water supplies; impress upon them the necessity of concentrating in the hands of one central bureau the results of the experiences of all, and ask whether they would be ready and willing to contribute each a small sum of money in order to create a common fund necessary therefor; the expectation being that if a sufficient number of adhesions were secured, our Society, having brought together all interested parties, would retire from the field, and the contributors would select their own agents to carry out the project. Doubts were expressed as to the ultimate success of the movement, but it was thought that the importance of the result would justify the effort.

The report was received with thanks, the Committee was continued, and the Board of Direction instructed to give the Committee such instructions as would extend the meaning of the original resolution in the direction indicated by the discussion.

The field before the Committee was extensive, and they entered into such investigations and correspondence as satisfied them that the programme as laid out, if it were possible to execute it, would confer a substantial benefit upon those interested. A large number of facts are collected and observations made every year at many points in the country in regard to the numerous evils from which public supplies are suffering; those facts and observations do not generally become known to outsiders, and, being isolated, are seldom fully or correctly interpreted; in many cases they lose a part of their importance from want of chemical and biological information and of proper direction.

If they were collected and compared by skillful persons in whose

hands the information would be concentrated for proper study and for the issuance of superior directions, the gain would be great and of general character at a very small cost to each. The Committee consequently applied itself to the preparation of a circular which they intended to send to all parties interested, briefly reciting the advantage to be derived from such centralization of the labors of each, as is above indicated, and asking whether the correspondents would be willing to contribute funds for the purpose of creating a Central Bureau to be organized, directed and maintained by the contributors.

The Committee soon learned, however, that a sister society, the American Water-Works Association, had appointed a committee similar in its scope to ours, that the said committee had been in the field before us, had corresponded with many parties and had been at work for some time.

We all know that it is, at best, difficult to obtain responses to such inquiries as we proposed to make, and we thought that our requests, coming immediately after similar ones, would only produce confusion. It also seemed to us that it would be best to unite our efforts with those of our predecessors in the field, and our Society, on the presentation of a subsequent report of progress from this Committee, authorized it to do so. We subsequently had a number of conferences with the chairman of the kindred committee of the American Water-Works Association, and we found that their methods were different from those which we had proposed to recommend. They spent a very large amount of time and labor in maintaining an extensive correspondence with persons interested in the subject at hand, received statements, made numerous analyses of water sent them, but, although we must highly commend their efforts in devoting so much time and attention to the question, we failed to find that any tangible practical results have been attained. It is impossible to cover usefully such an extensive field without the continuous employment of experts paid for the purpose, and we consequently thought it unadvisable to follow our friends on this, in our opinion, hopeless errand. It is even very discouraging to find that a number of correspondents, although they were offered advice and chemical analysis of any sample that they might furnish, without a dollar of expense to them, failed to respond to the advances of our friends.

Owing to the time that was consumed at the various stages of this investigation, our Committee, since the meeting of 1890, submitted only reports of progress. We expressed several times our opinion that we had no great hopes of success, but the subject was too important to be dropped without an investigation of the ground to be covered. In view of the efforts made by our sister society, and of the scant encouragement which we have received, we regret to report that, in our opinion, it is not advisable at present to go further, and although fully

believing that at some time the general value of the suggestion made by our Society may be recognized, the time is not now opportune for further efforts in the direction indicated.

Before closing this report, we deem it important to say that accurate knowledge of the subject we were charged with investigating has greatly advanced since the appointment of this Committee in 1889, and that large sums of money are annually devoted to this cause, under the direction of members of this Society and of others. At that time, one great difficulty in the way of comparing the results of experience at points widely apart was the lack of some fairly accurate method of enumerating the microscopical organisms which are known to be in many cases the chief cause of the impure conditions complained of. Recent experiments have furnished us since with a method of making the quantitative microscopical enumeration accurate enough for all practical purposes, which has in the last two years, in connection with the special sanitary work of the Massachusetts State Board of Health, led to results of great significance.

We do not consider it necessary to occupy space in referring to these results in detail, but merely refer the members of the Society to the two last reports of the Massachusetts State Board. From them it will be learned that a number of perplexing questions have been either wholly or partially solved during the life of this Committee. Again, similar work has been carried on for the last three years by the State Board of Health of Connecticut, and we understand that the State Boards of Health of some other States are considering the establishment of special laboratories for the same purpose.

There is, therefore, much less necessity for a work of the kind which it was proposed that this Committee undertake, than apparently existed three years ago when the Committee was appointed, and it is largely with a feeling of the essential uselessness of further effort in any line practicable for this Committee to pursue, that we ask to be discharged.

Respectfully submitted,

A. Fteley,
George W. Rafter,
Desmond FitzGerald.

MEMOIRS OF DECEASED MEMBERS.

JAMES OTIS MORSE, M. Am. Soc. C. E.*

DIED MARCH 8TH, 1883.

James Otis Morse was born at Cherry Valley, N. Y., in 1818, and graduated from Hamilton College in 1836. He then studied for and adopted the profession of a civil engineer, his first work being on the Genesee Valley Canal, then on the enlargement of the Erie Canal, Utica Division.

His next engagement was on the location of the New York and Erie Railway, between Port Jervis and Binghampton. He was afterward first assistant to W. J. McAlpine in building the United States Graving Dock at Brooklyn, a most difficult work, calling for the highest engineering skill in battling with the treacherous quicksands of that locality. This work was completed in 1851, after which he built the Savannah Water Works. At the close of the latter engagement he purchased the business of Walworth, Nason & Guild, at 76 John Street. He continued the engineering department of this business in connection with that of heating and ventilation, and built the pipe-bridge at the Croton Dam, the Watertown Gasworks, the Willoughby Street Bridge, Brooklyn, and the Spring Street Bridge, Saratoga.

About 1858 the business was removed to a larger and more convenient building, and from this place some of the larger buildings in New York, notably the two stores of A. T. Stewart, the Corn Exchange and Tribune Building, were furnished with heating and ventilating apparatus. The Bergen County (N. J.) Gas Works and the Englewood drainage system occupied much of his time.

He devoted himself to active business until the final moment when paralysis overtook him, on the 5th of March, 1883.

Mr. Morse will be remembered as the first Treasurer of our Society, who, after the war, was instrumental in its revival. The Society had languished for several years, in fact was considered as having died out entirely—no meeting having been held for some time—when it was proposed, by a few of the old members, to endeavor to organize a new society; but the lack of funds was an obstacle to its immediate success—nothing being considered as available from the wreck of the old organization, which was regarded as having died intestate. It was then that Mr. Morse stepped forward and presented an account in detail, showing every dollar that the Society had received and expended,

* Memoir prepared by Mr. Gardner D. Hiscox.

and allowing compound interest for the difference, showed a very respectable balance to the credit of the Society, and upon this the reorganization was based which has resulted so successfully.

Mr. Morse was a man of sterling honor and integrity, and conspicuous for his painstaking elaboration of the details of his profession, for which he was well equipped, both in a literary and scientific point of view. Had he continued in the practice of civil engineering, his marked qualities would have insured him a high standing in the profession. To the more lucrative practice of mechanical engineering, to which he devoted the latter part of his life, he carried his rare constructive ability; and his honesty of purpose and the soundness of his judgment ever caused him to be highly respected by all with whom he was brought into contact.

ALFRED BURNHAM ELLSWORTH, Jun. Am. Soc. C. E.

DIED JANUARY 10TH, 1893.

Alfred Burnham Ellsworth was born in Buffalo, N. Y., November 12th, 1865. After preliminary study he entered the Buffalo High School in 1880, and was graduated in 1884. The same year he entered the Massachusetts Institute of Technology, for the study of civil engineering, from which he was graduated in 1888. A short time after graduation he accepted employment with the Union Bridge Company of Buffalo, with which he remained about six months, then entering the service of the Pittsburgh Testing Laboratory. He was employed by this company chiefly as inspector of materials, being stationed at the Cambria Iron Works, at Johnstown, Pa.; Carnegie, Phipps & Co. Mills, at Pittsburgh; Rochester Bridge Works, Rochester, N. Y., and Elmira Bridge Works and Rolling Mills, Elmira, N. Y.

For two years he acted as Resident Engineer of the Company at the Union Bridge Works, Athens, Pa., where he inspected materials for bridges for the Illinois Central Railroad, the Missouri, Kansas and Texas Railroad, and many others.

In April, 1892, he removed to Buffalo and engaged in the private practice of his profession, in connection with his brother, under the firm name of Ellsworth Bros.

He met with success in his native city, and seemed to have a bright future, but on July 10th he was seized with hemorrhage of the lungs, which resulted in an illness from which he did not recover.

Mr. Ellsworth had a rare scientific mind, and a genial, generous disposition, which endeared him to a host of friends.

He became a Junior of the American Society of Civil Engineers, May 1st, 1889.

SIMEON S. POST, M. Am. Soc. C. E.

DIED JUNE 29TH, 1872.

Simeon S. Post, Civil Engineer, was born in Lebanon, New Hampshire, August 29th, 1805.

He first learned the trade of house-joiner in his native town. After completing his apprenticeship, he commenced business as an architect in Montpelier, Vermont. During his residence in Montpelier the question of the removal of the State House from that place to Burlington was agitated. Mr. Post was selected by the Montpelier interest to make a survey of the State for the purpose of determining the most advantageous location for the State Capital.

His engineering career began at that time, under the direction of the Hon. John Johnson, who was the Surveyor-General of the State, through whom he afterward obtained a situation, in 1836, upon the Auburn and Syracuse Railroad as Assistant Engineer under a son, Edwin F. Johnson, who was Chief Engineer of that road.

In July, 1840, Mr. Post was appointed Resident Engineer on the New York and Erie Railroad, in charge of the work then in progress at Piermont and its vicinity.

Upon the opening of that road to Ramapo, in 1841, he was appointed Superintendent of Transportation under the late H. C. Seymour, then General Superintendent. He held various positions on that road until 1851, when he was appointed Chief Engineer.

Through his efforts, coupled with those of the late Ezra Cornell, the original system of using the telegraph for the movement of railroad trains was evolved. This was done at the time the telegraph line was built along the line of the New York and Erie Railroad—about the year 1849. This was only accomplished after much argument in persuading the railroad company to allow the line to be built.

In March, 1853, he left the New York and Erie Railroad, to take the position of Chief Engineer of the Ohio and Mississippi Railroad. He held this position and also that of General Superintendent until 1855, when he returned to the New York and Erie Railroad as its Consulting Engineer, and the Chief Engineer of the Long Dock Company, and of Bergen Tunnel. He continued in charge of the latter work, and had succeeded in driving it until but 90 ft. of headings were required to connect the seven shafts, thus leaving the remainder of the rock excavation, simply through-cutting, when the work was suspended in 1858 for the want of funds.

After the suspension of work at Bergen Tunnel he turned his especial attention to the branch of engineering embraced in the construction of bridges, having made this a study for many years previously, and

in 1859 he published in the *American Railroad Journal* a "Treatise on the Principles of Civil Engineering as Applied to the Construction of Wooden Bridges"

After the publication of this "Treatise" he studied more particularly the application of iron to bridge constructions, and in 1863 obtained Letters Patent for his improvements in Iron Truss Bridges. The result was the "Post Truss," now well-known among civil engineers. In 1867 he was Consulting Engineer of the "Illinois and St. Louis Bridge Company." From 1867 until March, 1870, he devoted his time to the construction and perfection of his bridge. In March, 1870, he was appointed by Mr. Edwin F. Johnson, then Chief Engineer of the Northern Pacific Railroad, principal assistant and Engineer of Construction of that work.

He held this position but four months, when he was stricken by paralysis, and his professional career ended. He died at Jersey City, June 29th, 1872.

It is but just to Mr. Post to state that he was the inventor of the parabolic head-light reflector, used upon locomotives; the originator of the system of railroad baggage checks, so extensively adopted, and that he first drew the diagram for making railroad time-tables.

Mr. Post was one of the founders of the American Society of Civil Engineers, his membership dating from November 5th, 1852.

LIST OF MEMBERS.

ADDITIONS.

		Date of Membership.
HONORARY MEMBER.		
STORROW, CHARLES STORER	192 Beacon St., Boston, Mass.	Jan. 24, 1893
MEMBERS.		
ALVORD, JOHN WATSON	Jackson Park, Chicago, Ill.	Jan. 4, 1893
BROWN, WILLIAM HENRY	Chief Engineer Pennsylvania R. R., 233 South Fourth St., Philadelphia, Pa.	Dec. 7, 1892
FRANCIS, JAMES	Lowell, Mass.	Jan. 4, 1893
SPILSBURY, EDMUND GYBBON	216 West State St., Trenton, N. J.	Dec. 7, 1892
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BALDWIN, HENRY FURLONG	Chief Engineer Chicago and Eastern Illinois R. R., Chicago, Ill.	Dec. 7, 1892
KINEALY, JOHN HENRY	Washington University, St. Louis, Mo.	Nov. 2, 1892
NOSTRAND, PETER ELBERT	25 Palmetto St., Brooklyn, N. Y.	Sept. 7, 1892

JUNIORS.

GODDARD, LORING HAPGOOD	93 King Ave., Columbus, Ohio.	Dec. 6, 1892
LAWTON, PERRY	Rumford Falls, Maine	Jan. 3, 1893
MEYER, HENRY CODDINGTON, JR.	95 Milk St., Boston, Mass.	Jan. 3, 1893

CHANGES AND CORRECTIONS.

MEMBERS.

ALLEN, KENNETH.....Olean, N. Y.
BREITHAUPT, WILLIAM H.....Trenton House, Trenton, N. J.
BRODHEAD, CALVIN E.....Edgewater, Bergen Co., N. J.
BUCHHOLZ, C. W.....313 Girard Bldg., Philadelphia, Pa.
CHIPMAN, WILLIS.....103 Bay St., Toronto, Canada.
CHURCH, CHARLES T. .....Retsof, N. Y.
CRAIG, C. M. .....Darien, Ga.
CROES, J. JAMES R.....Morris Bldg., 68 Broad St., New York City.
CUNNINGHAM, D. W.....16 South Ninth St., Minneapolis, Minn.
GOLDMARK, HENRY .....637 Rialto Bldg., Chicago, Ill.
JENNINGS, HENRY C.....602 Equitable Bldg., Denver, Colo.
JOHNSON, PHELPS.....Manager Dominion Bridge Co., Lachine Locks, Quebec, Canada.
KILLEBREW, SAMUEL.....Box 109, Eagle Pass, Texas.
MARSTRAND, O. J.....18 Broadway, Room 805, New York City.
MORRIS, GOUVERNEUR.....Norton, Wise Co., Va.
MOSMAN, A. T.....Assistant, Coast and Geodetic Survey, Yuma, Ariz.
NORTHRUP, H. F. .....611 Hamilton Bldg., Pittsburg, Pa.
OWENS, HENRY K.....Box 38, Ellensburg, Wash.
PEARY, ROBERT E. .....Civil Engineer U. S. N., 2014 Twelfth St., N. W., Washington, D. C.
PERKINS, CHARLES P.....Bryn Mawr, Pa.
RUDLOFF, HENRY F. .....Caja de Agua al Truco 56, Caracas, Venezuela.
SAABYE, OSCAR .....189 Lexington Ave., New York City.
SAFFORD, EDWARD S. .....Fairview, Bergen Co., N. J.
SAVAGE, ALBERT C.....Care Trenton Iron Co., Trenton, N. J.
SIMPSON, GEORGE F.....Lock Box 191, Niagara Falls, N. Y.
SMITH, GEORGE C.....637 The Rookery, Chicago, Ill.
THOMPSON, GAYLORD.....Mechanicsville, N. Y.
VAN SANT, ROBERT L.....904 Olive St., St. Louis, Mo.
WALKER, WILLIAM W. .....3640 Lake Ave., Chicago, Ill.
WARD, CHARLES D.....15 Cortland St., Room 69, New York City.
YEATMAN, CHARLES P. .....Eighth St. and Grand Ave., Price Hill, Cincinnati, Ohio.

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ERLANDSEN, OSCAR .....Resident Engineer, Meeker Ave. Bridge, Brooklyn, N. Y.
FARLEY, JOHN M.....White Plains, N. Y.
HEMMING, D. W.....1216 Bolton St., Baltimore, Md.
WEBB, WALTER LORING .....217 De Kalb Sq., Philadelphia, Pa.

ASSOCIATE.

WARDER, JOHN H.....33 Wisconsin St., Chicago, Ill.

JUNIORS.

BOECKLIN, WERNER.....(Care E. Randolph, Gen. Supt. N. N. & M. V. Co.), Louisville, Ky.
CHIBAS, EDUARDO J. .....Engineer Carribbean Manganese Mines, Colon, U. S. Colombia.
FENN, WILLIAM H. .....Box 883, New Britain, Conn.
FOLWELL, A. PRESCOTT.....First National Bank, Room 7, Orange, N. J.
HAYES, GEORGE S.....The Kellogg Iron Works, Buffalo, N. Y.
JENCKES, LAWRENCE B. .....Stamford, Conn.
KINSEY, FRANK W. .....20 Market Square, Room 37, Providence, R. I.
SANDERS, F. N.....578 Madison Ave., Albany, N. Y.
SHREVE, ARTHUR L.....13 E. Franklin St., Baltimore, Md.
SMITH, CHARLES H.....Trust Co.'s Bldg., Middleton, N. Y.
STAIR, WILLIAM H.....Sheepshead Bay, N. Y.

RESIGNATIONS.

MEMBER.	Date of Resignation.
WALCOTT, CHRISTOPHER C.	Dec. 31, 1892

JUNIORS.

COLE, GEORGE W.	Dec. 31, 1892
TROWBRIDGE, FRANCIS C.	Dec. 31, 1892

DEATHS.

ELLSWORTH, ALFRED B.....Elected Junior, May 1, 1889; died Jan. 10, 1893.
TALCOTT, COOK.....Elected Member, Jan. 29, 1868; died Jan. 12, 1893.

DROPPED.

JUNIOR.	Date of Action of the Board.
WILLIAMS, WILLIAM PLUMB	Jan. 3, 1893

ADDITIONS TO
LIBRARY AND MUSEUM.

From American Institute of Mining Engineers:
- A Geological Map of the State of New York.
- Areal Work of the United States Geological Survey.
- An Occurrence of Coarse Conglomerate above the Mammoth Anthracite Bed.
- Industries of the Schuylkill Valley.
- Note on Manganese Steel.
- Note on the Occurrence of Grahamite in Texas.
- Proceedings of the Sixty-third Meeting, October, 1892.
- The Brown Segmental Wire-Gun.
- The Cause of Faulting.
- The Crushing and Separation of Ores.
- The Grading of Pig Iron.
- The Hill-Farm Parrish Mine Fire.
- The Hugh Kennedy Hot-Blast Stove.
- The Mesabi Iron Range.
- The Mineral Resources of Southeast Alaska.
- The Reduction Works of the Mount Stewart Lead and Silver Mining Company, Leadville, New South Wales.
- The Rock Drill applied to opening the Tapping-Hole of a Blast Furnace.
- The Wilburgh Luft (Air) Pyrometer.

From American Society of Mechanical Engineers:
- Transactions. Vol. XIII, 1892.

From Austrian Society of Engineers and Architects, Vienna:
- Bericht des vom Verein eingesetzten Comités zur Aufstellung von Typen für Walzeisen.

From Boston Public Library:
- Bulletin No. 4, January, 1893.

From Canadian Institute:
- Transactions, Vol. III, Part 1, December, 1892.

From Edwin Clements, Secretary, London:
- Parliamentary Report on Railway Rates and Charges Provisional Order Bill.

From L. E. Cooley, Chicago, Ill.:
- Main Drainage and Water Supply.
- The Future of Chicago and Illinois.
- Preliminary Report of the Drainage and Water Supply Commission, January, 1887.
- Address before the Academy of Sciences, February, 1887.
- Testimony before the Joint Committee of General Assembly of Illinois.
- Report of the Drainage and Water Supply Commission on the Bowmanville Cut-Off.
- Proceedings of the Illinois River Improvement Convention, Peoria, October, 1887.
- "There's Millions In It."
- The Lake and Gulf Waterway,
- The Waterway between Lake Michigan and the Illinois River.
- The Level of the Lakes as Affected by the Proposed Lakes and Gulf Waterway.
- A Vision of Empire.
- Water Supplies of Illinois.
- The Chicago Drainage and Waterway Laws.
- The Lakes and Gulf Waterway, as Related to the Chicago Sanitary Problem.
- Should the Drainage Law be Repealed?
- Ceremonies of Breaking Ground, Sanitary District, September, 1892.
- Proceedings of Board of Trustees of Sanitary District for 1890 and 1891.
- The Hennepin Canal.
- Lake Fluctuations.
- The Lake Michigan Glacier.
- Chicago Sewage.
- Specifications for Main Drainage Channel between Willow Springs and Joliet.

From Wm. P. Craighill, Colonel Corps of Engineers, Baltimore, Md.:
- Report of the Board of Trade of Baltimore, for year ending September 30th, 1892.

From E. T. Dumble, State Geologist, Austin, Texas:
- Third Annual Report of the Geological Survey of Texas, 1891.
- Bulletins Nos. 1, 2 and 3, Geological Survey of Texas.

From Friedrich von Emperger, Vienna:
- Die Kurvenweiche.
- Ueber die Zulässigkeit schwerer Fahrbetriebsmittel.

From T. Chalkley Hatton, Wilmington, Del.:
- Fifth Annual Statement of the Board of Directors of the Street and Sewer Department, Wilmington, Del., for the fiscal year ending April 30th, 1892.

From J. I. Haycroft, Sydney, N. S. W.:
- The Determination of Stresses by Graphic Analysis.

From Institution of Civil Engineers, London:
- List of Members, January 2, 1893.
- Abstracts of Papers in Foreign Transactions and Periodicals.
- Haltahaut Cut.
- Permanent Way for Viaducts.
- Westport Harbor Works, New Zealand.

From G. Leverich, Brooklyn, N. Y.:
- New York and Brooklyn Bridge. Specifications for the Brooklyn Terminal Station, January 10, 1893, and Approximate List of Materials and Work.

From Jas. L. Lusk, Capt. Corps of Engineers, Washington, D. C.:
- Report of the Operations of the Engineer Department of the District of Columbia, 1886-87 to 1891.

From Mining Institute of Scotland:
- Transactions, Vol. XIV, Part 6.

From Edw. P. North, N. Y.:
- Retail Prices and Wages, Report 986, 52d Congress, 1st Session.

From Nova Scotian Institute of Natural Science:
- Proceedings and Transactions. Vol. VI; Part 1-3, Vol. VII.

From Clifford Richardson, Washington, D. C.:
Sixth Annual Report of the Inspector of Asphalt and Cements for the fiscal year 1891-92.

From Addison M. Scott, Charleston, West Va.:
Great Kanawha River Improvement, Proposals for Building Locks and Dams Nos. 9, 10 and 11.
Iron Work for Locks and Movable Dams Nos. 9, 10 and 11.

From Sanitary District of Chicago:
Proceedings of the Board of Trustees, December 6, 14, 21, 1892; January 4, 1893.

From John Thomson, N. Y.:
The Color Printer.

From U. S. Department of Agriculture, Weather Bureau:
Bulletin No. 6, The Diurnal Variation of Barometric Pressure.

From U. S. Department of the Interior:
Report on Mineral Industries in the United States at the Eleventh Census.

From U. S. Department of the Interior, Patent Office:
Annual Report of the Commissioner of Patents for the year 1891.

From U. S. Department of State:
Reports from the Consuls, No. 146, November, 1892.

From U. S. War Department, Chief of Engineers:
Quarterly Statement of Stations of Officers of the U. S. Engineering Corps, January, 1893.
Fifty-nine reports of the examination of certain rivers and harbors.

From U. S Navy Department:
Pilot Chart of the North Atlantic Ocean, January, 1893.
Annual Report of the Chief of the Bureau of Steam Engineering for 1892.

From U. S. Treasury Department:
Annual Report of the Chief of the Bureau of Statistics upon the Foreign Commerce of the United States for the year ending June 30th, 1892.

From University of the State of New York:
University Extension Bulletin No. 2, 3 and 4, September, October, November, 1892.

From Herbert M. Wilson, Washington, D. C.:
Irrigation in India.

From E. A. Ziffer, Vienna:
Bericht über "Welches sind * * * * die bezüglichen Vortheile oder Nachtheile der drei gebräuchlichsten Schmalspuren nämlich; 1m, Om 75," Om 60"?"

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XIX.—February, 1893.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to the Society.)

OF THE SOCIETY.

FEBRUARY 1ST, 1893.—The Society met at 20 o'clock, President Metcalf in the chair; F. Collingwood, Secretary. Ballots were canvassed and the following candidates were declared elected: As Members, Theodore Arthur Allen, Evansville, Ind.; Horace LaFayette Eaton, Somerville, Mass.; Frank Clark Hand, Atlanta, Ga.; Walter Harris Knight, Lynn, Mass.; William Bateman Lawson, Denver, Colo.; George Herbert Leland (elected Junior, May 2d, 1887), Providence, R. I.; Augustus Mordecai, New York City; George Coffin Power, San Buenaventura, Cal.; George Herbert Webb, Lima, Peru. As Associate Member, Charles Henry Snow, New York City.

A paper by Robert Cartwright, M. Am. Soc. C. E., on "The Construction of the Power-House of the Rochester Power Co., adjacent to Genesee Falls, Rochester, N. Y.," was read by the Secretary, and discussed by Messrs. Brinckerhoff and Flagg.

A paper by James Duane, M. Am. Soc. C. E., on "The Effect of Tuberculation on the Delivery of a 48-In. Water Main," was also read and was discussed by Messrs. Brush, Bogart, Parsons, Brinckerhoff, Carr, Hutton, Collingwood and Tribus.

FEBRUARY 15TH, 1893.—The Society met at 20 o'clock, Vice-President Brush in the chair; F. Collingwood, Secretary. Discussion was resumed on the paper by James Owen, M. Am. Soc. C. E., read November 16th, 1892, on "The Controverted Questions in Road Construction." Written discussions received from Messrs. Edward Prince, Foster Crowell, E. W. Howe, William H. Grant, Latham Anderson, Edwin Mitchell and P. Callanan were read, and the subject was further discussed by Messrs. Oastler, H. M. Wilson, Bacot, Saabye, O'Rourke, North, and Owen.

OF THE BOARD OF DIRECTION.

FEBRUARY 28TH, 1893.—A form of circular to be issued to the Members of the Society, asking for contributions to meet the extra expenses of the Engineering Congress and for the establishment and maintenance of a Bureau of Information and Courtesy at the Society House for the benefit of visiting foreign engineers, was adopted. Action was taken in regard to members in arrears for dues. The following resolution was passed.

"*Resolved*, That, upon application, copies of the *Transactions* be hereafter sent gratuitously to such Technical Schools as are represented in any of the grades of Membership of this Society."

A form of circular-letter to be sent to all members, relating to the securing of proper accommodation for those who desire to attend the Convention of the Society at Chicago, was adopted. Applications were considered and other routine business transacted. Four candidates were elected as Juniors.

MEMOIRS OF DECEASED MEMBERS.

MATTHIAS O. DAVIDSON, M. Am. Soc. C. E.

DIED SEPTEMBER 1ST, 1872.

Matthias O. Davidson was born in Plattsburg, Clinton County, N. Y., March 28th, 1819, and at time of his death, September 1st, 1872, was nearly 54 years of age.

He was a son of Dr. Oliver Davidson and Margaret M. Davidson, and was one of a gifted family, his sisters, Margaret and Lucretia, having attracted much attention from the literary world of their time by their brilliant poetical efforts.

His professional career began in his eighteenth year.

One of his first appointments was on the Croton Aqueduct, where he served some years. He was subsequently employed upon the New York and Erie Railroad, and after that upon a road in Canada. Thence he went to Cuba in 1842, remaining there nearly a year on the Coliseo Railroad. Upon his return to this country, in 1843, and for ten years after, he was engaged in the Cumberland Coal region of Maryland, which he was principally instrumental in developing. While there he constructed an inclined plane, opened and worked the mines, and made many experiments in machinery and in the combustion of coal that have been of value to the profession.

In the year 1857, Mr. Davidson went to Havana, Cuba, under an appointment as Engineer-in-Chief of the Havana Railways, an office he filled with great credit to himself and advantage to the Company until he resigned his position in 1863.

During the period Mr. Davidson was in Cuba he reconstructed the entire length of the nearly worn-out road, some 110 miles long, elevating it from a condition of almost complete uselessness to a first-class railway in all respects. The improvements introduced by him covered everything relating to permanent way, bridges, passenger, freight and water stations, as well as a complete revolution in equipment. He also constructed 36 miles of new and heavy line, reflecting great credit upon himself, especially for his wisdom and energy in completing in time some heavy rock cutting and bridging, when a failure as to time would have been equal to loss of the franchise to the Company.

During his stay in Cuba he was often called upon to arbitrate delicate questions between conflicting interests, and his decisions were always looked upon as perfect and just solutions of the difficulties to be settled.

Shortly after Mr. Davidson's return from Cuba, he was appointed Chief Engineer and Superintendent of the Arizona Mining Company. He was in Arizona between two and three years in the exercise of these duties, and was at the same time United States Indian Agent for the Territory.

In the years 1865 and 1866, he was much occupied in the question of rapid transit for the City of New York, and was commissioned to proceed to London to observe and report upon the system of constructing and operating the underground railways in use there.

In 1867 he was appointed Chief Engineer of the New Haven and Derby Railroad, a short line involving many interesting points in location and construction, which he treated in the most successful manner.

From the year 1867 to the time of his death he was engaged in public works in Westchester County, N. Y., embracing a system of avenues, which he skillfully developed as Chief Engineer, and which were of great value to the county.

In 1869 and 1870 a portion of his attention was taken up in the consideration of such questions as the construction of the Shore Line Railway Bridge across the Connecticut River, and in the project of the Hudson River Highland Suspension Bridge, submitted to Boards of Engineers, of which he was a member.

In concluding this sketch, much might be said touching the excellent traits of character he possessed in a pre-eminent degree, which endeared him to all with whom he came in contact.

In his public life, as a civil engineer, he was an ornament to the profession, and in his private life he was the model of a Christian gentleman.

Mr. Davidson became a member of this Society, April 6th, 1853.

MOSES LANE, M. Am. Soc. C. E.

DIED JANUARY 25TH, 1882.

Moses Lane was born at Northfield, Vt., November 16th, 1823, and died at Milwaukee, Wis., January 25th, 1882. He attended the Norwich Academy in his native State. He then studied at the University of Vermont, from which he graduated in 1845 as a civil engineer. The first engineering work on which Mr. Lane was engaged, soon after his graduation, was on the Sullivan Railroad, in New Hampshire, and continued less than a year. This was followed by several years' work on the Vermont Central Railroad. In 1849 Mr. Lane ceased his engineering work and took charge of the Academy at Springville, N. Y., where he remained until 1853. In 1852 he was married to Miss Marinda Ingalls, who survives him. Upon leaving Springville in 1853, Mr. Lane accepted the position of Resident Engineer of the Albany and Susquehanna Railroad, having direct charge of the Albany division. The work upon this road was, however, suspended a year later, and Mr. Lane turned his attention again to teaching, and assumed charge of the Academy at Clarence, Erie County, N. Y., where he remained three years. At this time Mr. Lane was appointed Principal Assistant Engineer of the Nassau Water Works, then just begun, for the supply of the City of Brooklyn, N. Y. This work was under Mr. J. P. Kirkwood, who was one of the oldest and most noted hydraulic engineers in the United States. Mr. Lane retained this position for five years, until 1862, when upon the retirement of Mr. Kirkwood from the position of Chief Engineer of the Brooklyn Water Works, Mr. Lane was appointed to succeed him, and held this position for seven years, until May 1st, 1869. During the two years following Mr. Lane was associated with Mr. Chesbrough, of Chicago, in general practice. His greatest work, while in business with Mr. Chesbrough, was that of making the plans for the water system of Pittsburgh, Pa., upon which he spent nearly a year. During this period he also acted as consulting engineer for Indianapolis, Ind., Patterson, N. J., and several other cities.

In 1871 Mr. Lane was appointed Chief Engineer for constructing the Milwaukee Water Works, which position he held four years. To his great experience and success as a hydraulic engineer is due the fine system of water supply in this city. During this time he was consulting engineer for the water-works at Toledo, O., and also for Cincinnati, O. In 1875 Mr. Lane was appointed City Engineer of Milwaukee, having charge not only of the water-works, then completed, but of all other engineering work of the city. This position he retained until 1878. During the three years intervening between this

time and his reappointment as City Engineer, Mr. Lane was engaged in hydraulic and sanitary engineering all over the country. He was engineer in charge of constructing the new system of water supply for New Orleans, the sewerage system of Buffalo, N. Y., of Pittsfield, Mass., and a number of other cities. He was a member of the commission appointed by the City of Memphis, after the yellow fever epidemic, to perfect the drainage system of that city. During this same period Mr. Lane was consulting engineer for the cities of St. Louis and Boston. In 1880 he was called to Kansas City to make plans for the extension of the water-works system of that city, and while there was reappointed, in April, 1881, to the position of City Engineer of Milwaukee, a position he held at his death. About January 10th, 1882, Mr. Lane suffered an apoplectic stroke, from which it was expected he would soon recover; but partial internal paralysis accompanied the shock, and after the first few days he sank gradually, until 2 o'clock A. M., January 25th, when he breathed his last. He leaves a widow, three daughters and one son. Mr. Lane was elected a member of the American Society of Civil Engineers, December 4, 1867, and at the time of his death was Vice-President of the Western Society of Engineers.

Mr. Lane was a gentleman, always courteous and agreeable. He was respected and loved at home as the center of family life and enjoyment. His honesty and integrity were well known.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.		Date of Membership.
CONSTABLE, HOWARD	22 E. Sixteenth St., New York City	Dec. 7, 1892
EATON, HORACE LA FAYETTE	City Hall, Somerville, Mass.	Feb. 1, 1893
KNIGHT, WALTER HARRIS	T. H. Electric Co., Lynn, Mass.	Feb. 1, 1893
LAWSON, WILLIAM BATEMAN	504 McPhee Bldg., Denver, Colo	Feb. 1, 1893
LELAND, GEORGE HERBERT	20 Market Sq., Providence, R. I.	J. May 2, 1887 M. Feb. 1, 1893
MORDECAI, AUGUSTUS	Chief Engineer New York, Lake Erie and Western R. R., 21 Cortlandt St., New York City	Feb. 1, 1893
POWER, GEORGE COFFIN	150 Main St., San Buenaventura, Cal.	Feb. 1, 1893
RUTTAN, HENRY NORLANDE	City Engineer, Winnipeg, Manitoba	Jan. 4, 1893

ASSOCIATE MEMBER.

SNOW, CHARLES HENRY	Dept. of Engineering, University City of New York, New York City	Feb. 1, 1893

ASSOCIATES.

LESLEY, ROBERT WHITMAN	220 South Third St., Philadelphia, Pa	Jan. 31, 1893
TAYLOR, THOMAS ULVON	Austin, Texas	Jan. 31, 1893

JUNIORS.

GIBLIN, ARTHUR LEON	Lawrence Scientific School, Cambridge, Mass	Jan. 31, 1893
HALLIBURTON, WESLEY	Phœnix Bridge Co., Phœnixville, Pa	Jan. 3, 1893

CHANGES AND CORRECTIONS.

MEMBERS.

BROWN, CHARLES O	Riverside Bridge and Iron Works, Paterson, N. J.
CHURCH, CHARLES T	Geneva, N. Y.
COWLES, W. L	295 Beldin Ave., Chicago, Ill.
GILES, ROBERT	616 West Sixth St., Topeka, Kans.
HARDY, GEORGE R	Assistant Engineer of Construction, N. Y., N. H. & H. R. R., Stamford, Conn.
JACKMAN, H. H	5616 Wright St., Chicago, Ill.
KENLY, WILLIAM W	333 Temple Court, New York City.
PEGRAM, GEORGE H	Chief Engineer, Union Pacific System, Omaha, Neb.
PICKETT, WILLIAM D	Cheyenne, Wyo.
QUIMBY, H. H	Prin. Assistant Engineer, Phœnix Iron Works, Phœnixville, Pa.
SAABYE, OSCAR	175 Lexington Ave., New York City.
SMEDLEY, SAMUEL L	118 North Thirty-fourth St., Philadelphia, Pa.
SMITH, ISAAC A	406 The Oriel, Sixth and Locust Sts., St. Louis, Mo.
THACHER, EDWIN	Fifth and Jefferson Aves., Louisville, Ky.
TOBIAS, J. M	Peotone, Ill.
WROTNOWSKI, A. F	Clermont, Lake Co., Fla.
YONGE, SAMUEL H	U. S. Engineer Office, Jefferson City, Mo.

ASSOCIATE MEMBERS.

HILL, JOHN E .....125 E. Buffalo St., Ithaca, N. Y.
WILKES, J. K.....Engineer Sewer Commission, New Rochelle, N. Y.

JUNIORS.

ABBOTT, ARTHUR V.....Chief Engineer Chicago Telephone Co., 203 Washington St., Chicago, Ill.
BEUGLER, E. J .....South Norwalk, Conn.
DE LANCEY, EDWARD E.....46 Broad Ave., Sing Sing, N. Y.
GOSLING, EDGAR B.....Windsor Hotel, New York City.
LOWINSON, OSCAR.....S. W. cor. 114th St. and Pleasant Ave., New York City.
MAGOVERN, EDWARD E.....Manager Branford Lock Works, Branford, Conn.
MCCORMICK, GEORGE K.....Resident Engineer, W. B. & E. R. R., Mount Pocono, Pa.
PANI, C. E.....Chief Engineer's Office, Mexican Central R.R., Mexico, Mexico.
TUMBRIDGE, J. W.....20 First Ave., Waterbury, Conn.
YEATMAN, HENRY C.....Assistant Engineer, Mexican International R. R., Box 109, Eagle Pass, Texas.

DROPPED.

MEMBERS.	Date of Action of the Board.
BRAINARD, HENRY A	Jan. 3, 1893
CAMP, FRED. A	Jan. 3, 1893
FULLER, EUGENE F	Jan. 3, 1893
HOUSE, BRUCE F	Jan. 3, 1893
LAFON, THOMAS	Jan. 3, 1893
LEWIS, EVERETT W	Jan. 3, 1893
MAXWELL, DAVID F	Jan. 3, 1893
MCDOWELL, NATHAN M	Jan. 3, 1893
PARENT, ETIÉNNE H	Jan. 3, 1893
RAY, NATHANIEL C	Jan. 3, 1893
SCOTT, CHARLES A	Jan. 3, 1893
SHEARER, SAMUEL H	Jan. 3, 1893

JUNIORS.

BUTTS, EDWARD	Jan. 3, 1893
JOHNSTON, STEWART	Jan. 3, 1893
MOULTHROP, GEORGE E	Jan. 3, 189

BOOK NOTICES.

LOGARITHMIC TABLES.

By Prof. George William Jones, of Cornell University, 7 x 10¼ ins., cloth, pp. 160. Table of contents. Macmillan & Co., London, 1893.

Prof. Jones' work has been before the public for some years, the first edition having been issued in 1889. That it has been well received is evident from the fact that it has passed through three editions, the present issue being the fourth.

The matter has been entirely reset, and the work enlarged by 12 new tables. Its contents embrace logarithmic and trigonometric functions; constants, weights and measures; prime and constant numbers; squares, square and cube roots; reciprocals, etc.

The author has endeavored to secure accuracy in his work by careful comparisons of the tables and by new computations. It has been extensively used, in its former ecitions, by teachers, and has the endorsement of many prominent educators.

ADDITIONS TO LIBRARY AND MUSEUM

From American Institute of Mining Engineers, N. Y:
- An Investigation of Coals for making Coke in the Semet-Solvay Ovens.
- A Variable Speed Pulley.
- Hot-Blast Stoves.
- Method of Plumbing Shafts
- Note on Anthracite "Coal Apples" from Pennsylvania.
- Notes on Emmerton's Method for the Determination of Phosphorus.
- Notes on the Geology of the Half-Moon Mine, Pioche, Nevada.
- Observations on the Relations between the Chemical Constitution and Physical Character of Steel.
- The Bendigo Gold Field; Ore Deposits other than Saddles.
- The Phosphate Mines of Canada.
- Titaniferous Ores in the Blast Furnace.

From Astor Library, N. Y.:
- Forty-fourth Annual Report for the year 1892.

From Cornell University, Ithaca, N. Y.:
- Cornell University Register, 1892-93.

From James G. Dagron, Baltimore, Md.:
- Guide to Baltimore with an Account of the Geology of its Environs.

From Engineering Association of New South Wales:
- Proceedings, Vol. VI, 1890-91; Vol. VII, 1891-92.

From Gravity Flusher Company, San Francisco, Cal.:
- The Problem of the Sewerage of San Francisco, Cal.

From Harvard College, Cambridge, Mass.:
- Annual Reports of the President and Treasurer, 1891-92.

From Gilbert Macintyre Hunter, Maybole, N. B.:
- On the Santa Isabel Nitrate Works, Toco, Chili.

From Institution of Mechanical Engineers, London, Eng.:
- Proceedings, July, 1892.

From Italian Government:
- Album delle opere principali (Surcursale dei Giovi).
- Atti della Commissione d'Inchiesta sui Ritardi dei Treni Ferroviari.
- Atti della Commissione d'Inchiesta sull'esercizio delle Ferrove Italiane.
- Cenni Monografici dei Singoli Servizi compilati in occasione del l'Espozione Nazionale di Milano, 1881; Torino, 1884; Palermo, 1891-92. 3 vols.
- Relazione sulle Costruzione e sull'esercizio delle Strade Ferrate Italiane, 1885-1890. 6 vols.
- Relazione sulle Strade Comunali obbligatorie, 1875-1889. 10 vols.
- Relazione sulle Costruzione di Strade Nazionali e Provinciali nel Periodo dal 1° Gennaio, 1884, al 30 Giugno, 1885.
- Relazione sui Servizi Idraulici, 1876-1886, 7 vols.

From George W. Jones, Ithaca, N. Y.:
- Logarithmic Tables.

From Kansas University, Lawrence, Kans.:
- The Kansas University Quarterly, Vol. I, No. 3.

From Augustus Knudsen, San Francisco, Cal.:
- Triangular Surveys from Single Stations.

From James L. Lusk, Corps of Engineers, Washington, D. C.:
- Annual Reports of the Commissioners of the District of Columbia, for the years ending June 30th, 1883, and June 30th, 1886.

From Mayor of the City of Montreal, Can.:
- Annual Reports, Montreal, 1891.

From Daniel W. Mead, Rockford, Ill.:
- Comparative Values of Various Pavements.

From F. Andreas Meyer, Hamburg, Germany:
Die neuen Filteranlagen für die Wasserversorgung Hamburgs.

From Midland Institute of Mining, Civil and Mechanical Engineers, Newcastle, Eng.:
Proceedings, Vol. XIII, Parts CXV–CXVII.

From Mining Institute of Scotland, Hamilton, Scotland:
Transactions, Vol. XIV, Part 7.

From George S. Morison, Chicago, Ill.:
Specifications for Superstructure of Bridge across the Mississippi River at Alton, Ill., St. C. M., & St. L. B. R. R.

From Leo von Rosenburg, N. Y.:
First Annual Report of the Enterprise Mining Company, September 30th, 1892.

From Russell Process Company, Park City, Utah:
Amalgamation at the Ontario Mill compared with the Russell Process at the Marsac Mill.
The Russell Process at the Blue Bird Mill, Butte, Montana.
The Russell Process at Yedras, Sinaloa, Mexico.

From E. Sanford, Morris, Ill.:
The Chicago Drainage Bill.
The Supreme Court of Illinois. Owen Murray *vs.* The Sanitary District of Chicago.

From Horatio Seymour, Marquette, Mich.:
In Regard to a Ship Canal to the Sea.

From Scientific Society "Antonio Alzate," Mexico, Mexico:
Annals. Vol. V, 1891-92.

From Isaac W. Smith, Portland, Oregon:
Specifications of Works for the Water Supply of the City of Portland, Oregon.

From Collingwood Schreiber, Ottawa, Can.:
Annual Report of the Department of Railways and Canals (Canada), for the fiscal year, July 1st, 1891, to June 30th, 1892.

From U. S. Department of State:
Special Consular Report. Fire and Building Regulations in Foreign Countries.
Tariffs of Foreign Countries.
Australasian Sheep and Wool.
Reports from the Consuls of the United States. December, 1892.

From U. S. Department of the Interior, U. S. Geological Survey:
Eleventh and Twelfth Annual Reports, 1889-90, Part II, 1890-91, Part II.

From U. S. Navy Department:
Pilot Chart of the North Atlantic Ocean, February, 1893.

From U. S. Treasury Department:
Annual Report of the Lighthouse Board for the year ending June 30th, 1892.

From U. S. War Department, Chief of Engineers:
Twenty-three Specifications for the improvement of certain rivers and harbors.
Seventeen Reports on the improvement of certain rivers and harbors.

From University of the State of New York:
State Library Bulletin, Legislation No. 3, January, 1893.

From L. Van Wyck, N. Y.:
Report of the Board of Commissioners of Electrical Subways of the City of Brooklyn, December 31st, 1892.

From W. Hasell Wilson, Philadelphia, Pa.:
Forty-second Annual Report of the Managers of the Philadelphia and Erie R. R. Co., February 12th, 1893.

From E. A. Ziffer, Vienna, Austria:
Ueber Feldeisenbahnen.
Die Localbahnen in Galizien und der Bukowina.

By Purchase:
Reports in Relation to Supplying the City of New York with Pure and Wholesome Water.

Unknown:
Report upon "What Would be Just and Equitable Rates of Freights and Fares for the Railroads of California."

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XIX.—March, 1893.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to the Society.)

OF THE SOCIETY.

MARCH 6TH, 1893.—The Society met at 20 o'clock, Vice-President Brush in the chair; F. Collingwood, Secretary. Ballots were canvassed and the following candidates were declared elected: As Members, George Barclay Basset, Buffalo, N. Y.; George Washington Bramwell, New York City; John Carrol Chase, Wilmington, N. C.; Ernest Victor Clemens, New York City; William Bell White Howe, Jr., Knoxville, Tenn.; Franklin Buchanan Locke, Boston, Mass.; Samuel Lawrence Minot, Boston, Mass.; Walter A. Post, Newport News, Va.; Gustave Anthime Roullier, Flushing, N. Y.; Nelson Oliver Whitney, Madison, Wis. As Associate Members, Henry Clarendon Allen, Yonkers, N. Y.; William Grey (elected Junior, May 2d, 1888), Carmel, N. Y.; Henry Dickinson Woods, Boston, Mass.

A paper by G. Bouscaren, M. Am. Soc. C. E., on "The Restoration of the Cable Ends of the Covington and Cincinnati Suspension Bridge," was read by the Secretary, and was discussed by Messrs. Collingwood, Buck, Seaman, John Thomson, Frith, Whinery, H. S. Haines, Dunham, Gosling and North.

MARCH 15TH, 1893.—The Society met at 20 o'clock, Vice-President Macdonald in the chair; F. Collingwood, Secretary. The death of Wendell R. Curtis (elected Junior, March 3d, 1875; Member, June 4th, 1884) on March 7th was announced. A paper by Captain Thomas W. Symons, Corps of Engineers, U. S. A., on "Jetty Harbors of the Pacific Coast," was read by the Assistant Secretary, and discussed by Captain Black, General D. S. Stanley, Messrs. O'Rourke, A. McC. Parker, Macdonald and Frith.

MEMOIRS OF DECEASED MEMBERS.

CHARLES HENRY FISHER, M. Am. Soc. C. E.*

DIED JANUARY 18TH, 1888.

Charles Henry Fisher, son of Thomas Henry and Mary Chatfield (Hedge) Fisher, was born at Lansingburg, Rensselaer County, New York, June 10th, 1855. He was educated at the Lansingburg Academy, and afterwards took a partial course at the Rensselaer Polytechnic Institute, which Institution in June, 1882, gave him the honorary degree of Civil Engineer, in recognition of his successful service for nearly 30 years on the New York Central and Hudson River Railroad.

He was employed on the Racine, Janesville and Milwaukee Railroad in 1853; on the enlargement of the Erie Canal from 1854 to 1857. From 1858 to 1859 he was Principal of the Lansingburg Academy. He was Assistant and Resident Engineer on the New York Central Railroad from 1859 to 1868, and Chief Engineer of the Oswego and Lake Ontario Shore Railroad from April 24th, 1868, to January 1st, 1869.

He was at the latter date appointed Chief Engineer of the New York Central and Hudson River Railroad, which position he held until December 1st, 1885, when he was retired on half pay and was nominal Chief Engineer until his death. While in charge of this work he constructed the two additional tracks from Albany to Buffalo, the Geneva and Lyons Railroad, the Syracuse Junction Railroad and the Buffalo Junction Railroad. He built also the depots at Albany, Syracuse, Rochester and Buffalo; the Buffalo Stock Yard; the DeWitt yards and shops, and the Broadway crossing in Albany, and was Consulting Engineer of the Cantilever Bridge at Niagara.

He became a member of the American Society of Civil Engineers June 7th, 1869.

He married on June 27th, 1878, Henrietta Lester Mulford, daughter of Robert R. Mulford, of New York City.

*Compiled from a notice in the Records of the Rensselaer Polytechnic Institute.

WILLIAM MILLER ALLAIRE, Jun. Am. Soc. C. E.*

DIED DECEMBER 14TH, 1884.

William Miller Allaire was born August. 24th, 1854, in Louisborough, Westchester County, New York. He was a student at the College of the City of New York, leaving at the end of the Sophomore year. He entered the Rensselaer Polytechnic Institute in the fall of 1873, and graduated in 1876, when he entered upon his profession as engineer. For a time he was Secretary of the American Monitor Register Company in London, England. He was Assistant Engineer on the works of the New York Steam Heating and Power Company, but was best known as the Civil Engineer in connection with the moving and erection of the Egyptian Obelisk in Central Park under Lieutenant-Commander Gorringe. He was afterwards Engineer for the United States Electric Lighting Company. He became a Junior Member of the American Society of Civil Engineers on March 2d, 1881. His death was caused by pneumonia and occurred at his home in New York City.

ARTHUR READ HADDOCK, Assoc. Am. Soc. C. E.*

DIED FEBRUARY 28TH, 1885.

Arthur Read Haddock was the son of Charles C. and Hannah C. (Read) Haddock, and was born March 17th, 1842, in Buffalo, N. Y. After preparation at the Training School in Troy, N. Y., he entered the Rensselaer Polytechnic Institute in 1858 and was graduated in 1862. Some time after graduation, he was connected with the Delamater Works in New York. He was afterwards connected with the New York Produce Exchange, and a member of the firm of Haddock & Langdon, brewers. May 4th, 1881, he was elected as an Associate to the American Society of Civil Engineers.

Mr. Haddock was married, October 16th, 1877, to a daughter of Mr. Richard Van Wyck. He died of pneumonia February 28th, 1885, leaving a wife and two children.

* Memoirs prepared from the Records of the Rensselaer Polytechnic Institute.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

		Date of Membership.
BASSETT, GEORGE BARCLAY	298 Main St., Buffalo, N. Y.	Mar. 1, 1893
BRAMWELL, GEORGE WASHINGTON	59 Wall St., New York City.	Mar. 1, 1893
CHASE, JOHN CARROLL	Wilmington, N. C	Mar. 1, 1893
CLEMENS, ERNEST VICTOR	East 138th St., New York City	Mar. 1, 1893
DARLING, WILLIAM LAFAYETTE	Assistant Engineer Northern Pacific R.R., Helena, Mont	Oct. 5, 1892
HOWE, WILLIAM BELL WHITE, Jr.	P. O. Box 12, Knoxville, Tenn	Mar. 1, 1893
LOCKE, FRANKLIN BUCHANAN	53 State St., Boston, Mass.	Mar. 1, 1893
MINOT, SAMUEL LAWRENCE	Engineer of Construction, Old Colony R.R., Boston, Mass	Mar. 1, 1893
PADDOCK, JOSEPH HILL	Chief Engineer H. C. Frick Coke Co., Scottdale, Pa.	Oct. 2, 1892
POST, WALTER A	Newport News, Va	Mar. 1, 1893
ROSENZWEIG, ALFRED	5 Bucareli, Mexico, Mexico	J. June 7, 1883 M. Jan. 4, 1893
ROULLIER, GUSTAVE ANTHIME	20 Main St., Flushing, N. Y.	Mar. 1, 1893
WEBB, GEORGE HERBERT	151 South Centre St., Bethlehem, Pa	Mar. 1, 1893
WHITNEY, NELSON OLIVER	203 Monona Ave., Madison, Wis	Mar. 1, 1893

ASSOCIATE MEMBERS.

ALDEN, HERBERT CLARENDON	Box 197, Yonkers, N. Y.	Mar. 1, 1893
DEWEY, EDWARD WILKINS	16 William St., New York City	Sept. 7, 1892
GRAY, WILLIAM	Carmel, N. Y.	J. May 2, 1888 A. M. Mar. 1, 1893
WOODS, HERBERT DICKINSON	69 Mt. Vernon St., Boston, Mass	Mar. 1, 1893

JUNIORS.

DIEBITSCH, EMIL	Port Royal, S. C	Feb. 28, 1893
MICHIE, WILLIAM ROBERTS	Assistant Engineer, Pennsylvania R.R., Tyrone, Pa.	Feb. 28, 1893
SAX, PERCIVAL MOSLEY	516 Ashland Block, Chicago, Ill	Jan. 31, 1893
SWEITZER, NELSON BOWMAN, Jr.	The Water Works Co., San Antonio, Texas	Feb. 28, 1893

FELLOW.

LOVECRAFT, FREDERICK AARON....Palmer's Theater, New York City..... Nov. 1, 1892

CHANGES AND CORRECTIONS.

MEMBERS.

ALLEN, KENNETH.....(Care A. P. Allen), 107 Quincy St., Chicago, Ill.
BASSEL, ROBERT.....Royal Inspector of Railway Construction and Traffic, Gottingen, Germany.
DRAKE, WILLIAM A.....Santa Fé, Prescott & Phœnix Ry., Prescott, Ariz.
ELWELL, CHARLES C.....New York, New Haven & Hartford R.R., Stamford, Conn.
GREINER, JOHN E.....Engineer of Bridges, B. & O. R.R., Baltimore, Md.
HERRICK, HENRY A.....555 Haverhill St., Lawrence, Mass.
MERRILL, WILLIAM F.....General Manager C. B. & Q. R.R., Chicago, Ill.
PARKER, ANDREW MCCLEAN.....Assistant Engineer, Department of Docks, foot East Twenty-fourth St., New York City.
PEW, ARTHUR..... Chief Engineer, M. G. & A. Ry., Machen, Ga.
POST, ANDREW J.....N. E. cor. Twenty-second St. and Fourth Ave., New York City.
POST, LEVI W.....N. E. cor. Twenty-second St. and Fourth Ave., New York City.
POYNOR, D. A.....P. O. Box 363, Tyler, Texas.
PRENDERGAST, FRANCIS E.....Redlands, Cal.
SOOYSMITH, CHARLES.....Mills Bldg., New York City.
STEVENS, JOHN F.....Assistant Chief Engineer Great Northern Ry., Spokane, Wash.
SWAN, CHARLES H.....25 Wabon St., Boston, Mass.
TALCOTT, E. N. KIRK.....Goshen, N. Y.
THOMPSON, BENJAMIN.....Manager Indianapolis, Bloomington & Bedford R.R., Bloomington, Ind.
THOMPSON, GAYLORD.....317 Troup St., Rochester, N. Y.
WARD, JOHN F.....Sentinel, Ariz.
WELLS, CHARLES E.....St. Paris, Champaign Co., Ohio.
WILSON, CHARLES A.....General Superintendent Wheeling & Lake Erie Ry., Toledo, Ohio.

ASSOCIATE MEMBERS.

JANNEY, WILLIAM D.....Preston, Wayne Co., W. Va.
WHEELER, HARRY ROBERTS.....West Winsted, Conn.

ASSOCIATE.

WARDER, JOHN H.....100 Washington St., Room 401, Chicago, Ill.

JUNIORS.

CHADBOURN, WILLIAM H., Jr.....U. S. Engineer's Office, Newbern, N. C.
DEANS, CHARLES H.....Assistant Engineer, Sooysmith & Co., Mills Bldg., New York City.
FERGUSON, WILLIAM L.....Pennsylvania R.R., Ebensburg, Pa.
FOLWELL, A. PRESCOTT.....Atlantic Highlands, N. J.
GODDARD, L. H.....Wesley Block, Columbus, Ohio.
HORTON, SANDFORD.....Garrison's, Putnam Co., N. Y.
KOBAYASHI, KAYAJIRO.....45 Aizumicho, Yotsuga, Tokio, Japan.
PHILLIPS, H. C.....Box 136, Milford, Conn.

DEATHS.

CURTIS, WENDELL RHODES.....Elected Junior, March 3d, 1875; Member, June 4th, 1884; died March 7th, 1893.
THAYER, WILLIAM WATMOUGH. ...Elected Associate Member, December 2, 1891; died March 14th, 1893.

DROPPED.

ASSOCIATE.	Date of Action of the Board.
NICOL, THOMAS W.....	Jan. 3, 1893

BOOK NOTICES.

LOGARITHMIC TABLES.

WATER-TOWER PUMPING AND POWER-STATION DESIGNS. The "Engineering Record's" Prize Designs, suggestive for Water Towers, Pumping and Power Stations, 10½ x 13½ ins., cloth, 34 plates. The Engineering Record, 1893.

In December, 1889, the publishers of "The Engineering Record," offered $250 in prizes in a competition for designs for water-works pumping stations and water-towers. As a result of this offer 112 designs were submitted to the Committee of Award, composed of architects selected as judges.

Four of these designs to which prizes were awarded, and 13 which were considered as worthy of honorable mention, are reproduced in this volume.

To communities or water-work companies contemplating the erection of water-towers or pumping stations these plans may offer valuable suggestions.

ADDITIONS TO

LIBRARY AND MUSEUM.

From American Institute of Electrical Engineers:
The Cost of Steam Power produced with Engines of Different Types under Practical Conditions; with Supplement relating to Water Power.

From Horace Andrews, Albany, N. Y.:
Annual Report of the City Engineer of Albany, N. Y., for the year ending December 1st, 1892.

From Voisin Bey, Paris, France:
Notice sur les Travaux d'Amelioration de l'Embouchure du Danube et du Bras de Soulina, 1857-91.

From Board of Harbor and Land Commissioners, Boston, Mass.:
Annual Report for the year 1892.

From Board of Railroad Commissioners, Boston, Mass.:
Twenty-fourth Annual Report, January, 1893.

From J. H. Brownlee:
Map of the Province of British Columbia.

From Allan Campbell, New York:
Canals and Irrigation in Foreign Countries.
Streets and Highways in Foreign Countries.
Consular Report, No. 139. April, 1892.

From O. M. Carter, Captain Corps of Engineers, Savannah, Ga.:
Annual Report upon the Improvement of certain Rivers and Harbors in Georgia, and of Cumberland Sound, Ga.

From Chasseloup-Laubat, Paris, France:
Voyage en Amerique et principalement à Chicago.

From Cyrus Chambers, Jr., Philadelphia, Pa.:
The Evolution of the Brick Machine.

From E. T. Dumble, State Geologist, Austin, Texas:
Report on the Brown Coal and Lignite of Texas.

From M. T. Endicott, Washington, D. C.:
History of the United States Navy Yard, Portsmouth, N. H.

From "Engineering Record," New York:
Water-Tower Pumping and Power-Station Designs.

From C. O. Gleim, Hamburg, Germany:
Bericht über die Erfahrungen, welche in den letzten 25 Jahren bei Wasserwerken mit Grundwassergewinnung sich herausgestellt haben.

From G. G. M. Hardingham, London, Eng.:
Patents for Inventions and How to Procure Them.

From Intercontinental Railway Commission, Washington, D. C.:
Preliminary Report of the Executive Committee.

From Iron and Steel Institute, London, Eng.:
Journal, No. 2. 1892.

From James L. Lusk, Captain Corps Engineers, Washington, D. C.:
Communication from the Engineer Commissioner submitting Estimates of the Cost of Converting Rock Creek into a Closed Sewer.
Report upon the Gas and Electric Lighting in the District of Columbia.

From T. J. McMinn, New York:
Water Works Reports of various cities, as follows:
Albany, N. Y., 1880, 1882, 1887.
Bay City, Mich., 1884, 1886.
Boston, Mass., 1883-85.
Brookline, Mass., 1884.
Burlington, Vt., 1880-82.
Brooklyn, N. Y., 1882.
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Cincinnati, Ohio, 1884.
Chicago, Ill., years ending March 31st, 1875, and December 31st, 1875.
Detroit, Mich., 1877.
Erie, Pa., 1881, 1883.
Fall River, Mass., 1883, 1886.
Fitchburg, Mass., 1886.
Fort Wayne, Ind., years ending April 30th, 1881-85.
Grand Rapids, Mich., years ending April 30th, 1879, 1884.
Hartford, Conn., year ending March 1st, 1887.
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Lynn, Mass., 1886.
Manchester, N. H., 1884, 1886-87.
Minneapolis, Minn., year ending March 1st, 1884.
Newark, N. J., year ending November 30th, 1886.
New Bedford, Mass., 1883.
New Orleans, La., December 16th, 1876, to December 31st, 1877.
Norfolk, Va., years ending June 30th, 1882-84.
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Pawtucket, R. I. 1887.
Providence, R. I., April 1st, 1872: March 31st, 1884; September 30th, 1884; September 30th, 1886; December 31st, 1886; June 30th, 1887.
Poughkeepsie, N. Y., 1875-83.
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Troy, N. Y., 1882.
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Wilmington, Del., 1882.
Laws of N. Y. relating to a Water Supply for the City of Albany.
Manual of the Common Council of the City of Buffalo, N. Y., 1881.
Act of Incorporation of the Board of Water Commissioners of the City of Detroit, 1873.
Regulations of the Board of Water Commissioners of the City of Detroit, 1873.

Rules and Regulations made by the Board of Public Works of Grand Rapids, Mich.
Water Rates of the City of Hamilton, Can., 1872, 1877, 1880.
Financial Statement of the City of Hamilton, 1876.
Rules and Regulations of the Ithaca Water Works Co., 1872.
Report of the Trustees of the Sanitary Improvement Bonds of Jacksonville, Fla., 1886.
Statement of Receipts and Expenditures of the London Water Works for 11 months ending November 30th, 1880.
Schedule of Rates, London Water Works, 1878.
Charter of Board of Public Works, Port Huron, 1873.
Mayor's Address at the organization of the City Government, Port Huron, 1885–86.
Laws relating to the construction of Water Works for Rochester, N. Y., 1875.
Annual Water Rates for Rochester Water Works, May 1st, 1878.
Account of the Proceedings upon the transfer of the Salem Water Works November 16th, 1869.
Rules and Regulations of the Water Commissioners of the City of St. Catharines, 1878.

From J. P. Maxwell, Denver, Col.:
Sixth Biennial Report of the State Engineer of Colorado, 1891–92.

From Mining Institute of Scotland, Hamilton, Scotland:
Transactions, Volume XIV, Part 8.

From E. P. North:
Proceedings of the Deep Water Ways Convention, held at Detroit, December, 1891.
Endiguement et Dessèchment du Zuider Zée.
Étude sur les Eaux d'Alimentation.

From Albert A. Noyes, West Newton, Mass.:
Annual Report of the City Engineer of Newton, Mass., for 1891.

From Technical High School at Aachen:
Das Vermittelungs-Gesetz.

From Albert A. Pope, Boston, Mass.:
A Memorial to Congress on the subject of a Road Department at Washington, D. C.
Errors in School Books.
Improvement of City Streets.
The Bicycle in its Relation to the Physician.
The Movement for Better Roads.
Wagon Roads as Feeders to Railways.

From North of England Institute of Mining and Mechanical Engineers:
Transactions, Vol. XLI, Part 6; XLII, Part 1.
Annual Report and List of Officers, 1892–93.

From Francis Peyre Porcher, Charleston, S. C.:
Sui Criteri che del bono determinare la Scelta tra i diversi sistemi di bonificamento.
Sopra il bonificamento del Lago di Bientina.
Delle attuali condizioni del Cratere del Lago di Sesto ossia di Bientina.
Interno a due Instrumenti Automatici che descrivono in modo continuo le Curve delle Piogge e delle variazioni nel Pelo dell' acqua dei Fiumi.
Sfioratori a Stramazzo per Moderare le piene dei Fiumi.
Sulla continuazione del Ponte Solferino in Costruzione sull' Arno nella Citta di Pisa.

From Public Works Department, Madras, India:
Administration Report of the Public Works Department, Irrigation Branch, in the Madras Presidency, for the year 1891–92.

From John A. Russell, San Francisco, Cal.:
San Francisco Municipal Reports for the fiscal year ending June 30th, 1892.

From St. Paul (Minn.) Water Commissioners:
Eleventh Annual Report, December 1, 1892.

From Society of Civil Engineers, Paris, France:
Annuaire de 1893.

From Technical High School at Berlin:
Die Entwickelung der Mathematik im Zusammenhange mit der Ausbreitung der Kultur.

From Calvin Tomkins, New York:
The Maintenance of Macadamized Roads.

From U. S. Department of Agriculture:
Report of the First Annual Meeting of the American Association of State Weather Services.

From U. S. Department of the Interior:
Eleventh Census of the U. S., Part I, Public Debt.

From U. S. Geological Survey:
Seventeen Maps of the U. S. Geological Survey.

From U. S. Treasury Department:
Commerce and Navigation of the U. S., 1892.
Quarterly Reports of the Chief of the Bureau of Statistics Relative to Imports, Exports, Etc., June 30th, 1892, and September 30th, 1892.

From U. S. War Department:
Nineteen Specifications for the Improvement of Certain Rivers and Harbors,
Official Army Register for January, 1893.

Unknown:
Förteckning öfver Svenska Teknologföreningens Ledamöter Februari, 1893.
Les Chemins de Fer en Amerique.

By Purchase:
Annals des Ponts et Chaussées, 1863–65 1867.
Tables Générales, 1831–83.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XIX.—April, 1893.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to the Society.)

OF THE SOCIETY.

APRIL 5TH, 1893.—The Society met at 20 o'clock, President Metcalf in the chair; F. Collingwood, Secretary. Ballots were canvassed and the following candidates were declared elected as Members: William de la Barre, Minneapolis, Minn.; Edward Bernard Ives, New York City; George Albert Wetherbee, Malden, Mass., and Preston King Yates (elected Junior, June 16th, 1883), New York City. As Associate Members: Bernt Berger, New York City; Richard Sutton Buck, Vicksburg, Miss.; Abraham Lincoln Hyde, Cleveland, O.; Charles Harry Moore, Hempstead, N. Y.; Charles William Smith, New York City; Henry Maynadier Steele, New York City, and Walter Watson, Pittsfield, Mass.

The following deaths were announced: Joseph W. Putnam, Assoc. Am. Soc. C. E., died March 24th, 1893; William W. Thayer, Assoc. M. Am. Soc. C. E., died March 14th, 1893.

A paper by Walter McCulloh, Jun. Am. Soc. C. E., on "The Construction of a Water-Tight Masonry Dam," was presented by the author, with stereopticon illustrations, and the subject was discussed by Messrs. Bogart, T. C. Clark, Worthen, Brush, O'Rourke and McCulloh.

APRIL 19TH, 1893.—The Society met at 20 o'clock, Vice-President Brush in the chair; F. Collingwood, Secretary.

A paper by Joseph P. Frizell, M. Am. Soc. C. E., on "The Old-Time Water-Wheels of America," was read by the Secretary and discussed by Messrs. Brush, Collingwood, T. C. Clarke, Jos. T. Dodge, Thomson, Nichols, La Vallée, Parker, Tribus and Frizell.

A paper by D. Bontecou, M. Am. Soc. C. E., on "Notes on Cost of Operating Cable Railways," was read by the Secretary and discussed by Messrs. North, E. R. Johnson, H. W. Brinckerhoff, Leverich, T. C. Clarke, Nichols, Brush, Brendlinger and Dodge.

OF THE BOARD OF DIRECTION.

APRIL 5TH, 1893.—Action was taken in regard to sending out a circular requesting each member who has not already subscribed to the extra expenses of the Columbian year to contribute $10 for that purpose.

The geographical division of the membership of the Society into seven districts, for the purposes of the Nominating Committee, was adopted, in accordance with the resolution passed at the last Annual Meeting.

Applications were considered and other routine business transacted.

Announcement was made of the election of William Ezra Worthen, M. Am. Soc. C. E., as Honorary Member.

Six applicants were elected as Juniors.

MEMOIRS OF DECEASED MEMBERS.

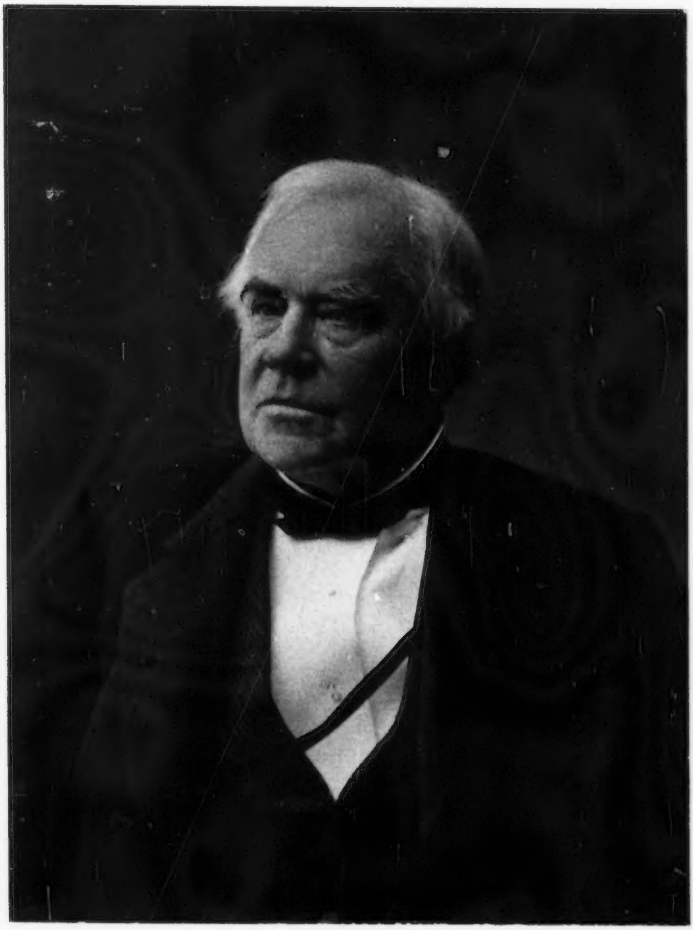
JAMES BICHENO FRANCIS, Past President and Honorary Member.*

DIED SEPTEMBER 18TH, 1892.

James Bicheno Francis was born at Southleigh, Oxfordshire, Eng., on May 18th, 1815. In 1829 he became assistant to his father, then Superintendent of the Duffrynllyn and Port Cawl Railway and Harbor, South Wales. In 1831 he was employed on the Great Western Canal in Devonshire and Somersetshire.

The extended railway operation then projected in America drew his attention to this country in 1833, and on April 11th of that year he landed in New York, to seek employment in the New World. He

*Committee to prepare memoir: G. S. Greene, Past President Am. Soc. C. E.; J. W. Adams, Past President Am. Soc. C. E.; W. E. Worthen, Past President, Am. Soc. C. E.



Very truly yours
James B. Francis

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Mrdu

applied to Mr. Whistler, who, with Major W. Gibbs McNeill, were then the most prominent engineers in this country, and appeared to so good advantage that he was at once assigned a position on the Stonington and Providence Railway (New York, Providence and Boston Railroad), the construction of which had been commenced under James P. Kirkwood as Resident Engineer.

In 1826 the proprietors of Locks and Canals, Lowell, Mass., had established a machine shop for the construction of general mill machinery, to which they added the construction of locomotive engines in 1834, and secured the services of Mr. Whistler to take charge of it, as engineer. Mr. Francis accompanied Mr. Whistler to Lowell from Stonington, and remained as his assistant until Mr. Whistler left in 1837, when Mr. Francis, at the age of twenty-two, was made engineer of the Locks and Canals Company, which position he held for 48 years.

In 1845 the proprietors of Locks and Canals gave evidence of their high appreciation of Mr. Francis' eminent ability and usefulness by appointing him their agent as well as engineer, with increased salary, and for the following 40 years, with full powers conferred upon him, he had the direction and management of the entire water-power, with the designing and construction of the numerous improvements which have resulted in establishing Lowell as the first manufacturing center in our country.

He was the recognized consulting engineer to all the various manufacturing corporations who derived their powers from the Merrimac River at Lowell.

In 1846 he designed the enlargement of the water-power at Lowell by the construction of the Northern Canal, where he introduced the method of operating the head gates by means of screws, the nuts being driven by turbines. As a canal for water-power, it is of unusually large proportions and of permanent construction, with solid timbers, head gates in granite ashlar, a river wall of the same, and side walls of rubble.

A reference to this improvement would be incomplete without mention of the provision which Mr. Francis made to meet the possibility of the highest freshet. He concluded that the lock gates of the old canal, which had been there since the inception of Lowell, were not high enough to serve as dam against such a freshet as had occurred more than half a century ago. He therefore carried up the side walls of the lock high above canal traffic, with grooves extending to its floor, and hung in these grooves a timber gate, 27 ft. wide by 25 ft. deep, by an iron strap.

Two years later, in April, 1852, there came a freshet, when it became necessary to lower this gate, and thus save the canal works, the mills and a large part of the city, an immense amount of property and

possibly many lives, from a torrent which would have swept everything in its course to destruction.

It was a little curious to see, in a country of almost annual floods, that the great freshet had waited 67 years, until Mr. Francis had the sagacity to provide for its reception. The citizens were not slow to appreciate this service by presenting Mr. Francis with a service of plate.

Another of his works at Lowell was the reconstruction of the Pawtucket Dam across the Merrimac River, and the skillful application of hydraulic lifts to the great gates of the Pawtucket Canal.

A large part of Mr. Francis' duty at Lowell was in the distribution of the water-power, and in the determination of its value, among the several corporations, in accordance with their respective rights. This has called for the execution of extended experiments on a large scale during many years, selections from which were first published in 1855, entitled, "Lowell Hydraulic Experiments." This embraced experiments on hydraulic motors and on the flow of water over weirs and in short canals. A subsequent edition has added much important matter, the result of further experiments, embracing flow of water through submerged orifices and diverging tubes.

This work forms an era in the literature of hydraulic engineering, and is recognized as of standard authority, the experiments having been conducted on a scale and with an accuracy of detail and record hitherto unprecedented; and whatever may hereafter be effected towards the evolution of reliable hydraulic formula will derive much of its value from a recognition of the principles and methods pursued by Mr. Francis in conducting these experiments, which were not undertaken as a purely elementary problem in hydraulic science, but, as before stated, grew out of the necessity for a practicable determination of the amount of water distributed to the various mills in their daily operation under every possible contingency of flow.

In 1844 Mr. Francis was elected a Fellow of the American Academy of Arts and Sciences.

In 1852, elected Member of the American Society of Civil Engineers at their first meeting, elected President for 1881, and Honorary Member April 5th, 1892; became a member of the Boston Society of Civil Engineers, July, 1848, and its President in 1874.

In 1851 he received from Dartmouth College the honorary degree of Master of Arts, and the same degree was conferred by Harvard University in 1858.

He was a Member of the American Philosophical Society of Philadelphia, and member of the Boston Society of Natural History; honorary member of Manchester Historical and Genealogical Society, Trinity Historical Society of Dallas, Texas, and the American Society of Irrigation Engineers of Utah.

Mr. Francis was so well known as standing at the head of his pro-

fession of hydraulic engineering that he had a wide practice as Consulting Engineer throughout the country. Among the more important works upon which he was called to advise were some 50 water-power establishments in nine States and two provinces; also, water works in 18 cities of five States and provinces; also, many foundations of important structures and irrigation works in California.

Mr. Francis resigned the office of agent and engineer of the Locks and Canals, Lowell, in 1885; this was 50 years after he entered the service of the Company, and his friends of the second generation of directors, on presenting him with a fine service of silver, added to their expressions of trust and friendship, the declaration, "that to the eminent ability and wisdom which have distinguished your administration, the marked success of the Lowell manufacturers has been largely due." He was then appointed Consulting Engineer of the company, which position he held at the time of his death, September 18th, 1892.

While in the line of his profession, as we have seen, he so identified himself with the material progress and improvement of his adopted home as to make his life an era in the history of the first manufacturing center of our country, he yet was ready at all times, through his kindly disposition, to contribute his services whenever required, either in private charity or in a more public but equally unremunerative line of personal effort, and thus filled many positions of trust and honor in the service of his townsmen in the City Council, and in the State Legislature. Sound judgment, sterling integrity, and the reputation which he early acquired of seeking the truth for its own sake in whatever investigation he might be charged with, led to his counsel being sought in many and varied lines of professional enterprise throughout the country; and his reports, characteristically clear and concise, which have fortunately been preserved, of much of his interesting practice as a consulting engineer, will prove of great value to his professional brethren who may have occasion to consult them. A list of them is appended, and they will be so placed as to be accessible to the Members of the Society.

Mr. Francis was an exemplary Christian gentleman, of most unassuming manner, high intelligence, a resolute will, of cheerful temperament, a pure heart, and a quiet sense of humor which showed in his countenance A well-balanced mind and clear judgment were his marked characteristics. His work in the world added to the knowledge of the learned, the wealth of the producer, and the comfort of the masses.

He illumined his high profession, made those near to him happy, and left the world the better for having lived in it, and the serene fortitude with which he faced death was but the logical end of his career. Mr. Francis was married to the daughter of the late George Brownell, of Lowell, who, with four children, survive him. His second son, Col. James Francis, succeeded his father as agent of the Locks and Canals when the latter retired in 1884.

INDEX TO PROFESSIONAL PAPERS OF JAMES B. FRANCIS, ON FILE AT LOWELL, MASS.

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    Embankment on Amoskeag Co.'s Canal, 1885–86.
    Wheels for New Mill, 1885–86.
    Rack for Jefferson Mill, 1885–86.
Anchor Ice. Stoppage of Water Main at Carleton, St. John, by Anchor Ice, 1886.
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Augusta, Me., Water Supply at Insane Asylum, 1876.
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Blackstone River Mill Owners *vs.* City of Worcester, 1876–85.
Back Bay (Boston) Drainage, 1863.
Baldwin's (S. K.) Improved Founeyron Turbine Water Wheels, Ashland, Mass., 1859.
Ballardvale Mills, 1876.
Ballston Spa, Calculations Relating to Wooden Trunks for J. A. Hovey, Flow of Water through Pipes, 1868–73.
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Bellegarde Water-Power, Transmission of Power, 1879.
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Bigelow Carpet Co.'s Dam, Washout, 1876–80.
Blanchard, John S., Correspondence with. Testimony in Equity Case, 1887.
Bodwell Water-Power Co., Milford, Me., Fire, 1888.
Boston Belting Co. *vs.* City of Boston, 1886.
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Boston, Commission on Supplementary Supply of Water from Mystic Pond, 1873.

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Cape Cod Canal, 1884.
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    Copies of Report to Cohoes Co., 1859.
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JOHN JAMES ABERT, Hon. M. Am. Soc. C. E.

DIED JANUARY 27TH, 1862.

John James Abert was born in Frederick City, Md., on September 17th, 1788, and died in Washington, D. C., January 27th, 1862.

He was the son of John Abert, a native of Marseilles, France, who owned a large plantation in Saint Domingo, and came to this country with Rochambeau in 1780. Young Abert was graduated at West Point in 1811, at once resigned and was employed in the War Office. While

engaged in this duty he studied law, was admitted to the bar of the District of Columbia and to that of the City of Cincinnati, intending to remove to the latter city and to engage in the practice of law.

In the beginning of the War of 1812 he volunteered as a private in an artillery company for the defense of the Capitol, and was rewarded for his services by a land warrant and by appointment in the Army, in 1814, as Topographical Engineer, with the rank of major. After employment upon surveys in different parts of the country, he made an instrumental reconnoissance over the mountains of Maryland, crossing the divide at points now occupied by the hotels and towns of Deer Park and Oakland, and upon the line afterwards adopted by the Baltimore and Ohio Railroad. He was next engaged upon the survey of the coasts of New England, New York and New Jersey under Ferdinand R. Hassler, a Swiss astronomer and Professor of Mathematics at West Point.

In 1829 he succeeded to the charge of the Topographical Bureau at Washington, D. C. About this time the people of the states east of the Mississippi, becoming restless and dissatisfied with the presence of the Indians, requested their removal. Major Abert was specially selected by President Jackson to conduct certain objectionable tribes beyond the Mississippi. The tact, prudence and discretion manifested by him in the earlier movements led to his appointment as United States Commissioner to conduct two migrations of especial difficulty and importance.

The Indians removed at different times were the Creeks, Wyandottes, Shawnees and Ottoways. The unimproved condition of the country made this exodus one of no small difficulty. The wagon trails extended for short distances and were of the rudest construction. The steamers used as ferry-boats were small, frail and badly built, and in crossing the great river the Indians gathered timidly upon the throbbing decks, fearful of an explosion. Through a wilderness of beech, of poplar and of cottonwood, across treacherous marshes and over shallow lakes, the red men transported their household goods, their wives and children, their drags and ponies, moving sadly on foot, with frequent complaints and often with tears; by slow marches they at last reached the prairies and higher lands upon the southwestern boundary of Missouri, now known as Indian Territory. The details of these movements, made between the years 1832–36, the number of the Indians, the cost of transportation, the route followed and the rivers crossed, will be found in the archives of the Subsistence Department, U. S. A. (Senate Doc., 1st Sess., 23d Congress).

Major Abert returned to his duty in charge of the Bureau, and in 1838 was promoted to the rank of Colonel in charge of the Corps. *"This was due to Colonel Abert, not only as senior officer, but for his

* Memorial notes of Col. I. W. Hughes, U. S. A.

long and zealous services, acknowledged acquirements and abilities in effecting its organization; for to him it emphatically owed its renaissance." Years of professional industry and studious forecast of future operations followed. Between the years 1832–40 were planned and organized several expeditions, memorable in their results. The unknown and unsettled region between the Mississippi and the Pacific had never been explored by scientific parties.

Colonel Abert was unremitting in urging the importance of these explorations, and he carefully organized and minutely instructed the parties engaged in surveying the different routes and in collecting the various scientific data. The geographical and geological explorations of Featherstonaugh were continued by the learned Nicollet, the friend of La Place, who was accompanied by a young lieutenant of topographical engineers, Frémont. Frémont's arduous explorations were followed by Stansbury in 1849, whose survey of the Great Salt Lake was continued in 1853 by the unfortunate Gunnison. Emory, Abert and Peck made explorations along the borders of Mexico, and Michler and Hughes carried their scientific investigations to the South American continent and the Isthmus of Panama.

But our country presented the most novel geological features. Strange rivers were crossed, plains were traversed, cañons and fertile valleys traced and the course of mountain ranges established, and the heights of passes definitely determined, which have since been occupied by railroads to the Pacific Coast. The existence of the gold of California was only known from the tales of the historian of Cortez. Over this region within fifty years civilization with its schools has extended its humanizing influence, the addition of fourteen States to the Union, with many populous cities, varied industries, extensive commerce, the enormous stimulus to the trade of the country caused by the gold of California, was made possible by the railroads to the Pacific, the construction of which were the main objects of these explorations.

The scientific societies of the country bear conspicuous evidence of the liberal contributions of the explorers to the advancement of knowledge. Under the active direction of Colonel Abert the attention of the Corps was not wholly absorbed in the work of exploration, important as he believed it to be. The improvement of the Atlantic seaboard, the coast of the Gulf of Mexico and the harbors of the Great Lakes received constant attention from the chief of the bureau. Congress promptly gave this object small, but material aid. The commerce of the Lakes, then in its beginning, was regarded with profound interest by the people. Several of Colonel Abert's reports were directed specially to the importance of this subject and attracted interest throughout the Lake States and in the halls of Congress. One of these reports, generally known as the "Great Harbor Report," was

read throughout the Union, and the Senate ordered 18 000 copies of this document to be printed. As the commerce of the northern lakes is now about one-fourth of the entire commerce between the States, this report deserves to be carefully studied by those who are interested in the subject.

The deepening of the St. Clair Flats was begun, and plans and estimates were prepared for a ship canal around the Falls of Niagara, and for a canal across the Peninsula of Florida.

The advancement of the Chesapeake and Ohio Canal was an object that commanded much of Colonel Abert's attention. This canal had its origin in a project of General Washington for establishing a commercial union between the tide-water of the Potomac and the navigable channel of the Ohio River. This work, great in its day, was finally completed as far as Cumberland, Maryland, but has since been superseded by the Baltimore and Ohio Railroad.

*"The Baltimore and Ohio Railroad owes to the memory of Colonel Abert a deep debt. He induced the United States Executive to detail officers of the Topographical Corps to the exploring and locating of that railroad and other railroads in the United States. It may with justice be recorded that to this timely aid in the infancy of railroads in the United States internal improvement owes largely its advance in our Union."

Notwithstanding the demand of these multifarious duties Colonel Abert was a student of several cognate sciences and greatly interested in their advancement. Endeavors in this direction had spread the fame of the Corps beyond the Union. He was made an honorable member of many of the foreign societies and an active member of the more important of the home institutions.

He was one of the founders and an active member of the National Institute, of Washington, D. C. This society met in the Department of the Interior, situated on F Street, between Seventh and Ninth Streets. Its extensive and valuable collections illustrating the sciences of natural history, geology, mineralogy, archæology and ethnology filled the hall, which extended the entire length and breadth of the building.

When Congress established the Smithsonian Institution, with the late eminent Professor Henry as its head and secretary, the purposes for which the National Institute had been organized ceased, and its entire collections, representing the arts and sciences brought together at great expense and exhibited with benefit to the public, were turned over to the care of the younger and better-endowed Institution. Colonel Abert's private collection of minerals, among which were some specimens of great value, were placed in the same hands.

Colonel Abert was too old to take an active part in the unhappy civil contest, which, beginning in 1861, was concluded in 1865. He

* Memorial notes of General J. G. Swift, U. S. Engrs.

was made an honorary member of the American Society of Civil Engineers, March 2d, 1853.

The closing paragraph of the general order of the War Department announcing the death of Colonel Abert after stating that "to his fostering care and judicious management," the Topographical Corps "owed its existence," continues as follows: "The geographical and other information which its officers have collected have challenged the admiration of the scientific world; while the practical benefit of their labors has been felt in every State and every Territory, the whole forming a proud monument to him who was its founder."

"Abert, John J., Brevet-Major Topographical Engineers, November 22d, 1814. Brevet Lieutenant-Colonel Topographical Engineers, November 22d, 1824. Colonel, July 2d, 1838. Retired, September 9th, 1861. Died, January 27th, 1863. Brevet Lieutenant-Colonel, November 22d, 1824, for ten years' faithful service in one grade."

Colonel Abert was elected a Member of the American Society of Civil Engineers, March 2d, 1853.

SAMUEL MORSE FELTON, F. Am. Soc. C. E.*

DIED JANUARY 24TH, 1889.

Samuel Morse Felton was born at West Newbury, Mass., July 17th, 1809. He was a descendant of Lieutenant Nathaniel Felton who settled at Salem in 1633. His parents were Cornelius Conway Felton and Anna Morse Felton. Through business troubles his father lost his property, and Mr. Felton's early years were passed in great poverty. His early educational opportunities were therefore very limited, but he made the best use of them possible.

In 1815 his father moved from West Newbury to Saugus, where he was able to attend school, paying for his tuition by labor. In the summers he worked on neighboring farms, and in winter sawed wood. He entered a wholesale grocery store in Boston at the age of fourteen, where he was for four years both errand boy and chief clerk, devoting all his spare moments to study. He then studied at a high school at Geneseo, N. Y., maintaining himself by acting as clerk and book-keeper for the school. In 1830 he had acquired money enough to be able to enter Harvard University, where he supported himself by teaching, with some small assistance from others. He graduated in

* Abstract from a memoir published in the *Journal* of the Associated Engineering Societies, Vol. XI, 1892.

1834 with high honors, and removed to Charlestown where he taught a private school for two years. He also, about this time, began the study of civil engineering under Mr. Loammi Baldwin, entering finally upon the practice of civil engineering in 1837. His first work was in connection with the Boston and Roxbury Mill Dam in the famous case of Horace Gray and others against the Boston Water-Power Company. In 1841 he made the first survey for the Fresh Pond Railroad, a short road for carrying ice to Charlestown, and constructed the road during that year. He was next engaged on the Pittsburgh road as Chief Engineer, becoming in 1845 its Superintendent and remaining such until 1851. He made surveys also for the Cheshire Railroad and Rutland and Burlington Railroad, was Chief Engineer of the Vermont Central Railroad, and was Consulting Engineer of the Sullivan and of the Ogdensburg Railroads.

In 1851 he was made President of the Philadelphia, Wilmington and Baltimore Railroad, which had previously been unsuccessful financially, but which, after much effort, he succeeded in placing upon a paying basis. In his labors to overcome the effects of mismanagement on this road, and to remove those who were guilty of it, he was obliged to withstand much personal abuse, both private and public, but he persevered and in the end overcame all opposition.

He was instrumental in obtaining the charter and building the bridge on the line of this road across the Susquehanna. He was the first also to perceive the advantages of through connections of railroads. In 1853 he urged the importance of a direct connection with the Baltimore and Ohio Railroad to the West, but was at the time defeated in his efforts.

He interested himself in 1852 in the building of a railroad from Dover Landing, on the Delaware River, to the Chesapeake. In 1856 his annual report discussed the merits of the operation of railroads by contract, which method had, under his management, produced very favorable results on the Philadelphia, Wilmington and Baltimore line, so that in 1859 the operating expenses were but 37½% of the receipts.

He encouraged the use of coal-burning engines, and the "Daniel Webster" placed on the Philadelphia, Wilmington and Baltimore Railroad in 1857 is believed to have been the first successful coal-burning passenger engine in service in the United States.

In 1860 he was offered a very large salary by the Philadelphia and Reading Railroad, but accepted one on the Philadelphia, Wilmington and Baltimore Railroad of one-third less amount, as he thought it as much as the latter road ought to pay him, while at the same time he felt it his duty to remain with it.

He was apprised by Miss Dix, in the winter of 1860, of indications among the Secessionists, of a well-defined intention to seize Washington. He immediately took energetic measures to defeat this scheme and

to place his road in the best position he could. He learned also that there was an intention to assassinate Mr. Lincoln on his passage through Baltimore, and succeeded, by a ruse, in running the train carrying Mr. Lincoln through Baltimore without the latter's presence being known to the inhabitants.

In the trying times following the fall of Fort Sumter, he succeeded in passing troops from the North through and around Baltimore to the aid of Washington. During this time he made large expenditures without authority, feeling that the safety of his country should be paramount with him. The next four years were years of arduous labor, amid discouragement and criticisms of every kind brought about by his efforts to supply the enormous requirements of the Government in the way of transportation, and resulted at the last, in 1864, in a shock of paralysis which compelled him to retire from work. His health was so far restored that in September, 1865, he became President of the Pennsylvania Steel Company, which grew to be one of the largest concerns of its kind in the United States. He served as director of many railroads during this time. For ten years he was Director of the Pennsylvania Railroad, and bore an important part in the development of this great corporation. In 1862 to 1865 he was a commissioner of the Hoosac Tunnel, appointed by the Governor of Massachusetts, and after the completion of the Pacific Railroads in 1869, he was appointed by President Grant a Commissioner to inspect them. These were the only political positions he ever occupied, having declined a nomination of Congress.

He became a Fellow in the American Society of Civil Engineers March 23d, 1870.

It is given to few men to win, as he did, a marked success as a teacher, as an engineer, as a railroad president, and as a manufacturer. Fewer still, perhaps, enjoy so entirely the respect, the confidence and the affection of all who know them. Those who knew him best honored him most.

WILLIAM W. THAYER, Assoc. M. Am. Soc. C. E.

DIED MARCH 14TH, 1893.

William Watmough Thayer was the son of President Judge M. Russell Thayer, of Philadelphia. He came of a highly respected ancestry, being, on his father's side, the lineal descendent in the eighth generation of Richard Thayer, of Braintree, Mass., who came from the banks of the Severn, in England, to settle in Massachusetts Bay, in

1640. On his mother's side he was a lineal descendant in the fourth generation of Chief Justice Benjamin Chew, who was his mother's great-grandfather and a man of great learning, distinction and influence in the early history of Pennsylvania. William W. Thayer was born at Chestnut Hill, in the County of Philadelphia, July 11th, 1862. He received his primary education from private tutors and at the Episcopal Academy in Philadelphia. Thence he passed to the University of Pennsylvania, entering the class which graduated in 1882. Subsequently he was entered as a law student at the University, but after a brief experience abandoned the study of the law for the profession of a civil engineer—a profession for which his natural tastes and his fondness for and proficiency in mathematics afterwards proved that he possessed a peculiar adaptability. He pursued his engineering studies in the office of his elder brother, General Russell Thayer, who was then engaged in the same profession in Philadelphia, being at the time also Chief Engineer and Superintendent of Fairmount Park. He remained in General Thayer's office until 1883, when he joined the staff of the Assistant Chief Engineer of the Philadelphia and Reading Railroad Company, in which service he remained about three years, being engaged in a great variety of work, and especially on the narrow-gauge road between Philadelphia and Atlantic City. During a part of this period he was engaged in the inspection of mines, but much the larger part of his time was spent upon work in the field on location and construction, being frequently detailed to take charge of independent surveys and other work. In 1885 and 1886 he was Assistant Inspector of Bridges and Track Material for the Pennsylvania Railroad Company. Leaving the Pennsylvania Railroad in 1886, he accepted the position of Assistant Engineer in the Baltimore and Ohio Railroad Company.

While in this service his principal work was superintending the building of the Twenty-fifth Street Tunnel, in Philadelphia, on the line of the connecting road between the Baltimore and Ohio and the Philadelphia and Reading Road—a work of great labor and responsibility, and requiring, for its successful execution, the best engineering talents. This work he performed in the most creditable manner, and it greatly added to his professional reputation. An interesting, but greatly condensed, summary of this work is contained in a paper of his read before this Society at its annual meeting at Fortress Monroe, in June, 1892. At the conclusion of the work in 1887, he received the highest commendation from his immediate superior on the work, and also from Colonel H. T. Douglass, Chief Engineer of the Baltimore and Ohio Railroad Company.

Mr. Thayer then accepted the position of Assistant Engineer of Fairmount Park, an employment which yielded him a larger income and the duties of which had a strong attraction for him.

On December 15th, 1889, he entered upon a still larger and more important field of duty, having been at that time appointed Surveyor and Regulator of the Fourth Survey District of Philadelphia, and a member of the City Board of Surveys, in which employment he continued until his death. During the period in which he held this position, he accomplished an immense amount of work in all the various branches relating to municipal engineering, the regulation of lines, the construction of culverts, the superintendence of grading and paving, and the preparation of maps and surveys. Among the latter were the surveys connected with the construction of the Reading Terminal. He was especially interested in the survey of the newly projected boulevard from the City Hall to Fairmount Park, upon which work he expended a great deal of time and labor, and the Director of Public Works of the City of Philadelphia has lately ordered that his name shall be placed upon the map of the survey as the engineer by whose labor and talents it was accomplished. A large part of this survey may be said to have been made in the air and on the tops of houses, and the exposure he underwent in its prosecution there is reason to believe contributed to the attack which ended his short but brilliant professional career. He had for some years past suffered from an organic weakness of the heart, which, being greatly aggravated by an attack of influenza, proved fatal. He passed away peacefully and painlessly, after a short illness, at his father's residence in Philadelphia, which was his home, at half-past nine o'clock on the morning of Sunday, March 14th, 1893.

Thus suddenly and prematurely ended a career which gave the brightest promise of future usefulness and of the highest distinction in his profession. The President of the American Society of Civil Engineers, Mendes Cohen, of Baltimore, writing concerning him, says; "The engineering profession has lost in him an able, bright and conscientious member, and the American Society of Civil Engineers one who had already established for himself, in its annals, a record of work well done, and who, had he lived, would have reflected distinction upon it." The Director of Public Works of the City of Philadelphia wrote: "The city loses an efficient officer from its bureau of engineers, whose reputation was constantly increasing with his usefulness in his chosen profession. His genial nature and his devotion to his profession caused the highest respect for him from those with whom he had official business." The engineers of Fairmount Park, wrote: "Our lives are brighter from having known him." The Board of Surveys of Philadelphia, in an appropriate official minute, expressed in a very feeling manner "their sense of the misfortune sustained by the Board and the community at large in the loss of this faithful and efficient officer." On every side among his acquaintances and friends were heard utterances of heartfelt sorrow at the melancholy intelli-

gence of his death. It may be truly said that seldom has the death of so young a man elicited in this community such general and genuine expressions of sorrow as in his case.

Mr. Thayer possessed many attractive qualities and accomplishments. Not only was he a very able mathematician and surveyor, with a degree ef experience and proficiency in his profession acquired by few at so early an age, but he possessed also social characteristics which had a great fascination for all who came within the sphere of their influence. His disposition was of the sweetest and most amiable nature, never quick to take offense, but always ready to overlook it. He disliked to hear anyone ill-spoken of. He belonged to several societies, scientific and literary. He was elected as an Associate Member of the American Society of Civil Engineers, December 2d, 1891, and was also a member of the Engineers' Club of Philadelphia, of the Franklin Institute, of the Historical Society of Pennsylvania, of the Markham Club, of which he was one of the founders and a governor, and of several other social organizations. He had been, from his boyhood a member of the Episcopal Church by baptism, confirmation and communion, and was at the time of his death President of a chapter of the Brotherhood of St. Andrew. Although unmarried, he was very fond of children, and never failed to win speedily their confidence and affection. While lying ill in his last sickness, one of the children of the poor whom he had befriended sent him a few simple flowers, with a scrap of paper, on which was written, "hoping you may soon be better I will say a little prayer for you, that you may recover, if it be God's will." But it was not God's will, and so his star of life hastened to its setting long before it had mounted half way to its meridian, and with it went down the hopes of many friends who had long watched his career with interest and affection.

WILLIAM H. TALCOTT, M. Am. Soc. C. E.*

DIED DECEMBER 8TH, 1868.

William H. Talcott, son of Captain William Talcott and Dorothy Blish, was born in Hebron, Conn., April 7th, 1809. His parents removed to Rome, N. Y., during his childhood. His educational opportunities were limited to the ordinary district school, which he attended only in the winter season. He acquired his higher mathematics without instruction while tending a grist mill. In 1830 he went to Albany, N. Y., where he studied engineering under John B. Jervis. During

* Prepared by E. N. K. Talcott, M. Am. Soc. C. E.

the years following to 1837 he was engaged on a large survey on the Hudson River, near West Point, on the survey of the Albany and West Stockbridge Railroad, and was Superintendent and Engineer of the Mohawk and Hudson Railroad.

In 1837 he was appointed Constructing Engineer of the Genesee Valley Canal, with headquarters at Cuba, Alleghany County, N. Y. This was one of the State works extending from Rochester to Olean, a distance of 107 miles, and was, next to the Erie Canal, the most important State work at the time. Upon its completion in 1841, he was appointed a resident engineer upon the Erie Canal Enlargement, and removed to Fort Plain, N. Y., where he remained for four years.

In 1845 he was called to the Morris Canal in New Jersey as Resident Engineer and Superintendent of the Western Division. His superior skill and ability won for him, in 1846, the position of Chief Engineer and Superintendent of the Canal, a position which he held at the time of his death, 22 years later. In September, 1864, upon the death of Hon. Ephraim Marsh, the President of the Canal Company, he was elected President, and during the last four years of his life he filled the three offices of President, Superintendent and Chief Engineer. It was in connection with the Morris Canal that his great skill both as an engineer and manager was developed. When he first became connected with the canal in 1845, its entire tonnage was about 58 000 tons. In 1867 it exceeded 825 000 tons. In 1845 it was little more than a ditch of no profit to any one. Under his management it developed into one of the principal coal carrying companies of the country, and, although it had a competing railroad on each side, paid regular dividends upon both preferred and common stock. The system of inclined planes used upon the canal in their improved form was the creation of his brain, and was absolutely essential for the successful operation of the canal. They attracted the attention of engineers, not only throughout the United States, but in foreign countries.

In 1857 he was called to make a survey of and report on the Shubenacadie Canal of Nova Scotia, especially with a view of introducing inclined planes similar to those in use on the Morris Canal. In 1858 he was called upon by the government of Nova Scotia to report upon the practicability and probable cost of a ship canal between St. Peter's Bay and Bras d'Or Lake on Cape Breton Island.

Shortly before the war he was offered the position of Chief Engineer of the James River and Kanawha Canal, in Virginia, on his own terms, by a French syndicate which proposed to enlarge and improve the canal as then built from Richmond to Buchanan, and extend it westward to a connection with the Ohio River. He declined this offer because of the necessity which it involved of his moving into a slave State and using slave labor.

During the War, at the time of the threatened difficulty with Great

Britain on account of the capture of Mason and Slidell, he was appointed by the Governor of New York one of a Board of Engineers to devise means of defending the Harbor of New York against an attack by a British fleet.

In 1854, in connection with the Messrs. Thomas, of Catasauqua, Pa.; Messrs. Chidsey, Knight and others, of Easton, Pa.; Ephraim Marsh and Benjamin G. Clarke, of New Jersey, he incorporated the Thomas Iron Company, of Pennsylvania, and he was a stockholder and director in the company till his death. Its wonderful success was largely due to his business enterprise and sagacity in its inception, location and operation.

He was also a stockholder and director of the Second National Bank of Jersey City, N. J.; a corporator and trustee of the Provident Institution for Savings of Jersey City, N. J.; for many years President of the Patent Water and Gas Pipe Company, of New Jersey, and always proved himself, in every position where placed, a prompt, thorough man of business.

He was among the foremost of the Hydraulic Engineers in this country, and his testimony on questions of Hydraulic Engineering was considered authority. In the great suit between the Delaware and Hudson Canal Company and the Pennsylvania Coal Company, his testimony as to the effect of certain enlargements made to the canal cover many pages of printed matter.

He was one of the founders of the "American Society of Civil Engineers and Architects," now known as the "American Society of Civil Engineers," his membership dating from February 2d, 1853, and was up to the time of his death one of its Directors and most active members.

For more than twenty years before his death he was a member and ruling elder of the First Presbyterian Church, of Jersey City, N. J. He died at Jersey City, December 8th, 1868, leaving a widow and seven children surviving him.

COOK TALCOTT, M. Am. Soc. C. E.*

DIED JANUARY 12TH, 1893.

Cook Talcott, son of Mosely Talcott and Harriet (Cook) Talcott, was born in Marlboro', Conn., August 11th, 1826. He was a farmer's son, and received a common school education, followed by one year at

* Memoir prepared by E. N. K. Talcott, M. Am. Soc. C. E.

Brainerd Academy, Haddam, Conn. He taught school for two years in Freehold and Mount Holly, New Jersey. He began his study of engineering in 1850, under the late William H. Talcott, Chief Engineer and Superintendent of the Morris Canal, in New Jersey.

On January 6th, 1859, he was married to Acsah E. Chamberlain, of Amsterdam, N. Y.

In 1853 Mr. Talcott went to Missouri as Chief Engineer of the City and County of St. Louis. He returned to New Jersey in 1856 and was again connected with Mr. William H. Talcott on the Morris Canal and in the Hay-Beater Press Company until about 1868, when he entered the service of the Taylor Iron Works at High Bridge, N. J. He built the dam at this place, and had charge of all the engineering work in the reconstruction of the works. He afterwards built the High Bridge branch of the Central Railroad of New Jersey, from High Bridge to Port Oram, in Morris County, New Jersey, being in the employ of the Central Railroad of New Jersey at that time. In the latter part of 1876 he went to San Francisco, where he formed a partnership with Mr. A. Onderdonk, and under the firm name of Talcott & Onderdonk rebuilt, under contract, the ferry slips and sea wall at that place, being employed on this work until sometime in 1880. After completing the work at San Francisco, he surveyed and located a railroad from Forest City to Astoria, in Oregon. He was also for a time Superintendent and part owner of Rex Montes Mine, Cal. He returned to New York City in 1880 or 1881, and was engaged in work for the Driggs Drainage Company on the Hackensack Meadows, and in work on the Brooklyn Elevated Railroads until 1888, when he took a contract for building the piers and approaches of the Hudson Suspension Bridge for the Hudson Suspension Bridge and New England Railway Company. This work has, however, been at a standstill for some three years. He was also the Consulting Engineer of the Duluth, Redwing and Minnesota Railroad, and would probably, had he lived, been contractor for its completion.

During the late War he received an unsought commission as Colonel from Governor Olden, of New Jersey, with authority to recruit a regiment for the U. S. Service, but was compelled to decline the honor on account of his health.

On the morning of January 8th, 1893, he was seized with a severe chill, followed by pneumonia and died on January 12th, leaving a widow, but no children.

His professional life was a successful one, he having had charge of large works, and in every instance to the entire satisfaction of the parties concerned. As one of the older members of the Society, his loss will be greatly felt and his genial face and companionship missed.

Mr. Talcott was elected a Member of the American Society of Civil Engineers April 15th, 1868.

CORRECTION.—MOSES LANE.

CHARLES PAINE, Past President Am. Soc. C. E., writes: "In the notice of Moses Lane, in February *Proceedings*, it is wrongly stated that his first work was on the Sullivan railroad. In fact, on leaving the University, he, with his classmates, J. M. Clark, M. Am. Soc. C. E., and Joseph Thomas Dodge, M. Am. Soc. C. E., entered immediately the service of the Vermont Central Railroad. When Mr. Collins Chesbrough, who was for a short time Chief Engineer of the Vermont Central, left it to build the Sullivan, Lane went with him. This led to his acquaintance with J. C. Chesbrough and to Lane's employment by him upon the Cochituate Water Works."

LIST OF MEMBERS.

ADDITIONS.

		Date of Membership.
HONORARY MEMBER.		
WORTHEN, WILLIAM EZRA	63 Bleecker St., New York City. { M. / Hon. M.	Dec. 4, 1867 / April 4, 1893
MEMBERS.		
DE LA BARRE, WILLIAM	St. Anthony's Falls Water-Power Co., Minneapolis, Minn.	April 5, 1893
IVES, EDWARD BERNARD	University Club, New York City	April 5, 1893
WETHERBEE, GEORGE ALFRED	City Engineer, Malden, Mass.	April 5, 1893
YATES, PRESTON KING	236 West 55th St., New York City. { J. / M.	June 6, 1883 / April 5, 1893
ASSOCIATE MEMBERS.		
BERGER, BERNT	35 Broadway, New York City	April 5, 1893
BUCK, RICHARD SUTTON	Vicksburg, Miss.	April 5, 1893
HYDE, ABRAHAM LINCOLN	209 Crawford Road, Cleveland, O.	April 5, 1893
SMITH, CHARLES WILLIAM	31 Broadway, New York City	April 5, 1893
STEEL, HENRY MAYNADIER	718 Equitable Building, Baltimore, Md.	April 5, 1893
WATSON, WALTER	97 Appleton Ave., Pittsfield, Mass.	April 5, 1893

JUNIORS.

COXE, EDWARD HAVILAND	Assistant Engineer C. & H. C. & I. Co., Buchtel, O...	Jan. 31, 1893
DAVIS, ARTHUR LINCOLN,	Bridge Dept. C. O. R. R., St. Albans, Vt.....	April 4, 1893
FISH, JOHN CHARLES LOUNSBURY	A. T.O. House, Ithaca, N.Y.	Jan. 31, 1893
HOYT, JOHN T. NOYE	109 East 45th St., New York City.....	Feb. 28, 1893
IRWIN, JAMES CLARK	Room 18, N. Y. C. Station, Albany, N. Y.....	April 4, 1893
KNAPP, HERMAN MERIWETHER	Hamilton Bridge Co., Hamilton, Ontario, Canada..	April 4, 1893
RITTENHOUSE, HARVEY	Supervisor N. & W. R. R., Richlands, Va.....	April 4, 1893
WAGNER, JOSEPH WOOD	Phœnix Bridge Co., Phœnixville, Pa.....	April 4, 1893

CHANGES AND CORRECTIONS.

MEMBERS.

ALVORD, JOHN W.	5203 Hibbard Ave., Chicago, Ill.
ASPINWALL, THOMAS	606 Phillips Building, Boston, Mass.
BECKLER, E. H.	935 Jackson Boulevard, Chicago, Ill.
BOEKE, AUGUSTUS W.	712 Armstrong Ave., Kansas City, Kans.
BURROWES, F. S.	U. S. Engineer Office, Hickox Building, Cleveland, O.
CLARKE, DAVID D.	Prin. Assistant Engineer City Water Works, Portland, Ore.
COOPER, S. L.	Commissioner of Public Works, Yonkers, N. Y.
CORNELL, GEORGE B.	Chief Engineer East River Bridge Co., 29 Broadway, Room 175, New York City.
DAGRON, JAMES G.	100 E. Franklin St., Baltimore, Md.
DARLING, WILLIAM L.	Engineer Dept., Northern Pacific R. R., St. Paul, Minn.
DOANE, WALTER A.	Meadville, Pa.
DOUGLAS, HENRY T.	S. E. cor. Baltimore and Calvert Sts., Baltimore, Md.
ELY, THEODORE N.	Chief of Motive Power, P. R. R., 233 S. 4th St., Philadelphia, Pa.
ERNEST, OSWALD H.	Col. U. S. A., Sup't U. S. Military Academy, West Point, N. Y.
FIELDS, SAMUEL J.	Chief Engineer Dept. Public Works, Buffalo, N. Y.
FLAGG, J. FOSTER	102 Sixth Ave., Brooklyn, N. Y.
GRISWOLD, FRANK L.	Chilecito, Rioja, Argentine Republic.
HAYES, R. SOMERS	30 East 51st St., New York City.
HEGEMAN, WILLIAM W.	230 Lexington Ave., New York City.

HERRICK, HENRY A.....38 Pickering Block, Manchester, N. H.
LANDRETH, WILLIAM B.....Jamestown, N. Y.
LINVILLE, JACOB H.....Lansdowne, Pa.
LOVETT, THOMAS D.....82 West 3d St., Cincinnati, O.
LOWETH, CHARLES F.....94 East 4th St., Room 12, St. Paul, Minn.
LUSK, JAMES LORING.....Captain Corps of Engineers, U. S. A., West Point, N. Y.
MACKLIN, JOHN G.....15 Bryson Block, Los Angeles, Cal.
MACRITCHIE, CHARLES.....21 Quincy St., Chicago, Ill.
MARSTRAND, O. J.....Garden City, N. Y.
MAXWELL, JAMES R.....Charter House, Media, Pa.
MILLER, ALEXANDER M.....Major Corps of Engineers, U. S. A., Alvey Building, Galveston, Tex.
NICHOL, JOHN.....21 Quincy St., Chicago, Ill.
NICHOLS, WILLARD A.....P. O. Box O, Redlands, Cal.
SAUNDERS, WILLIAM L.....Secretary and Engineer Ingersoll-Sergeant R. D. Co., Havemeyer Building, New York City.
SCHAUB, JULIUS W.....Gen. Man. Bridge and Constr. Dept., Pottsville Iron and Steel Co., Pottsville, Pa.
WATSON, WILLIAM P.....637 Burke Building, Seattle, Wash.

ASSOCIATE.

TRAUTWINE, JOHN C., Jr.....15 South 7th St., Philadelphia, Pa.

JUNIORS.

BELL, G. J.....Care A. T. & S. F. R. R., Sibley, Mo.
BRERETON, THOMAS J.....Engineer Cumberland Valley R. R., Chambersburg, Pa.
BLUNT, R. ALLAN.....Assistant Engineer Assam-Bengal Ry., Shillong, Assam, India.
BYERS, M. L.....Swissvale, Pa.
HARWI, S. J.....Assistant Engineer Baltimore Forwarding & R. R. Co., 2121 Maryland Ave., Baltimore, Md.
KIBBÉ, AUG. S.....Brigantine, N. J.
KINSEY, WARREN RUE.....Hotel Osborne, Hornellsville, N. Y.
MCCULLOH, WALTER.....7 Crick Block, Niagara Falls, N. Y.
PANI, CAMILO E.....Assistant Engineer Tampico Harbor Works, Tampico, Mexico.
PURSLOW, E. J. S.....Evans Block, Room 7, Riverside, Cal.
SCARBOROUGH, F. W.....Assistant Engineer, Maintenance of Way, C. & O. Ry., Hinton, W. Va.
STAIR, WILLIAM H.....Plattsburgh, N. Y.
STARR, WILLIAM H.....General Man. North Hudson Co. Ry., Hoboken, N. J.
TREADWELL, LEE.....207 Elm St., Sioux City, Ia.
TUMBRIDGE, J. W.....Hotel St. George, Brooklyn, N. Y.

DEATH.

PUTNAM, JOSEPH W.....Elected Associate, March 3, 1880; died March 24, 1893.

BOOK NOTICES.

THE MINERAL INDUSTRY, ITS STATISTICS, TECHNOLOGY AND TRADE IN THE UNITED STATES AND OTHER COUNTRIES, FROM THE EARLIEST TIME TO THE END OF 1892.

Vol. I. Edited by Richard P. Rothwell, Editor of the *Engineer and Mining Journal*, 7 x 9½ ins., cloth, pp. xxiii x 628. The Scientific Publishing Company, N. Y., 1893.

The *Engineer and Mining Journal* has been engaged for a number of years in the collection of statistics of the mineral resources and mining industries of various countries, and it has accumulated a great amount of information, a portion of which has been given to its readers for some years, in the annual statistical numbers of that paper. The statistics thus gathered have proved of such value to engineers and to every one in any way interested in the mining industry, as evidenced by many letters from experts and by appreciative notices in technical papers, that the publishers have issued this volume that the information may be had in a more enduring form than in the Annual Statistical numbers.

The labor of collecting such a mass of statistics as are given in the volume must have been very great, and the work could not have been accomplished without the coöperation of hundreds of persons engaged in the development of the mineral resources of the world, or of those whose connection with mining industries made such assistance possible.

The scope of the volume is extensive, embracing the whole range of the metals and of the most important minerals, their localities, development, conditions of mining and cost of production, as well as their total product and profit from mining.

The great mining industries of iron, coal, lead, copper, silver and gold, not only in the United States, but in other countries, have had special attention, and the fullest statistics of cost, product and profit are given in detail.

A mass of statistics of the production, importation and exportation of iron and steel is given, together with the number of employees and rates of wages in the different States of the United States, which must prove of value to all interested in the industry. The work is one which must commend itself, through its admirable arrangement and the value of its statistics, to every mining engineer and to the mining world in general.

ADDITIONS TO LIBRARY AND MUSEUM.

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From British Association for the Advancement of Science, London, Eng.:
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From Director-General of Railways, Calcutta, India:
Administration Report on the Railways in India, for 1891-92.

From Engineering Record, N. Y.:
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From Edwin Gilpin, Halifax, N. S.:
Report of the Department of Mines, Nova Scotia, for 1892.
The Iron Ores of Nova Scotia.
The Use of Safe Explosives in Coal Mines.

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Twenty-second Annual Report of the Department of Docks for the year ending April 30th, 1892.

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Graving Docks.
Lighthouse Lenses.
Strength of Concrete Slabs.
Proceedings, Vol. CVI.
List of Members, April 1st, 1893.

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Report of the Sewerage Commissioners Transmitting a Report of the City Engineer upon a System of Sewerage and Sewage Disposal for the City of Brockton, Mass.

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Annual Catalogue, 1892-93.
Annual Report of the President and Treasurer, December 14th, 1892.
Memoir of James B. Francis.

From T. C. Mendenhall, Washington, D. C.:
Gravity Research. Determinations of Gravity on the Pacific Coast, in Alaska and at Washington, D. C., and Hoboken, N. J.

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Some Considerations Pertinent to Senate Bill No. 276, known as "The General Street Surface Railroad Bill."
Cable Railways *vs.* Horse Railroads.
The New York Arcade Railway.
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Proceedings of the Rapid Transit Commission, December 13th, 1883.
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National Cable Co.'s System of Traction Railways.
Annual Report of the Secretary for Mines, Victoria, 1886.
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The Mining Industry, its Statistics, Technology and Trade for 1892.

From Sanitary District of Chicago:
Proceedings of the Board of Trustees, March 29th, April 5th, 12th, 1893.

From Seismological Society of Japan, Tokio, Japan:
Journal, Vol. I, 1893.

From School of Practical Science, Toronto, Canada:
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From Collingwood Schreiber, Ottawa, Canada:
Railway Statistics of Canada, 1892.

From Hamilton Smith, London, Eng.:
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From U. S. Department of the Interior:
Compendium of the 11th Census, 1890.
Report on the Introduction of Domestic Reindeer into Alaska.
Education in Alaska.

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Reports from the Consuls, January, February and March, 1893.

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Coaling, Docking and Repairing Facilities of the Ports of the World.

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Statistical Abstract of the United States, 1892.

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Annual Report of the Chief of Engineers, 1892.
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Fourth Annual Report for the year ending December 31st, 1892.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XIX.—May, 1893.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to the Society.)

OF THE SOCIETY.

MAY 3D, 1893.—The Society met at 20 o'clock, President Metcalf in the chair; F. Collingwood, Secretary. Ballots were canvassed and the following candidates were declared elected: As Members, Ira Osborn Baker, Champaign, Ill.; Charles Kimball Bannister, Ogden, Utah; David Walker Lum, Knoxville, Tenn.; Vsevolod Evguenievitch Timonoff, St. Petersburg, Russia. As Associate Members, Anson Wood Burchard, Danbury, Conn.; Ernest Grey Freeman, Alton, Ill.; John Venable Hanna, Holly Springs, Miss.; Edwin Allston Hill, Cincinnati, O.; Richard Haden Hood, Columbia, Mo.; Henry Brigham Looker, Washington, D. C.; Alfred Milton Mosscrop (elected Junior May 4th, 1887), Rochester, N. Y.; Morris Robeson Sherrerd, Troy, N. Y.; Erasmus Darwin Wileman, Toledo, O.

A paper by H. D. Whitcomb, M. Am. Soc. C. E., on "The Improvement of the James River, Va.," was read by the Secretary, and discussed by Messrs. Croes, Hutton, Brinckerhoff, Bogart, Brush, Gosling and Washburn.

MAY 17TH, 1893.—The Society met at 20 o'clock, Vice-President Macdonald in the chair; F. Collingwood, Secretary. The death was announced of Augustus Woodbury Locke, elected Member June 7th, 1882; died May 14th, 1893.

A paper by J. W. Schaub, M. Am. Soc. C. E., on "The Detroit

Union Depot Viaduct," was read by the Secretary, and discussed by Messrs. Collingwood and Triest.

A paper by Cyrus W. Babb, Jun. Am. Soc. C. E., on "Rainfall and River-Flow," was read by the Secretary, and discussed by Messrs. Worthen, Macdonald, Hutton, Fteley and Bogart.

OF THE BOARD OF DIRECTION.

MAY 2D, 1893.—A new list of rates for advertisments in the *Transactions* was adopted, increasing them about 70 per cent.

It was decided that it is not best for the Society to make arrangement for a special train to Chicago, or for accommodations other than have been provided.

The arrangements for the meetings of the Convention, discussion of papers, reception, and all other matters requiring attention at Chicago, were referred to the President with power.

Applications for membership were considered, and other routine business transacted.

Charles Marshall Saeger, Allentown, Pa., was elected as Associate, and nine applicants were elected as Juniors.

MEMOIRS OF DECEASED MEMBERS.

JOSEPH NAPOLEON DU BARRY, M. Am. Soc. C. E.*

DIED DECEMBER 17TH, 1892.

Joseph N. Du Barry was born at Bordentown, N. J., November 30th, 1830. His father, who was the medical attendant of Joseph Bonaparte, ex-King of Spain, then living in exile, gave him his name through respect to the house of Bonaparte.

His early life was passed at the place of his birth, where, through the influence of the high moral qualities and intelligence of his parents, he imbibed those principles which so marked his later life. In the spring of 1847, at the age of 17, he entered the employ of the Pennsylvania Railroad Company as rodman to the engineering corps then

* Committee to prepare Memoir, Joseph M. Wilson, M. Am. Soc. C. E.; Samuel Rea, M. Am. Soc. C. E.

J. N. DeBary

engaged in the preliminary surveys of the road through Allegheny and Westmoreland Counties.

His conscientious devotion to duty, his firmness of purpose, and his great integrity, soon won him promotion, and he rose rapidly in his profession and in the esteem of his employers. After three years of practical service in the field he was made Assistant Engineer of Construction and continued in this position until 1852, when he became Principal Assistant Engineer on the Surveys for the Sunbury and Erie Railroad. In 1853 he became Principal Assistant Engineer of the North Pennsylvania Railroad, between Bethlehem and Philadelphia, on both surveys and construction. In 1856 he accepted a position as Associate Chief Engineer on the Pittsburgh and Connellsville Railroad. The same year he was made Associate Engineer with Mr. Edward Miller on the Pacific Railroad of Missouri, both on surveys and construction. In 1858 he became Superintendent of the Western Division of the Pittsburgh, Fort Wayne and Chicago Railroad, between Crestline and Chicago, and completed and opened this line into Chicago.

In 1861 he was called to the Northern Central Railroad as General Superintendent and Engineer. He entered the service of the Northern Central Railway Company as General Superintendent and Engineer, having been appointed to that position November 28th, 1862. He was soon called upon to give important aid to the Government in furnishing prompt and efficient railroad facilities, meeting the pressing and immediate demands for transportation of troops and material between Pennsylvania and Washington. His executive abilities were here especially marked. In 1869 he was elected Vice-President and remained in that position until 1875, when he was elected Assistant to the President of the Pennsylvania Railroad Company, Thomas A. Scott. While acting in this capacity he was made Vice-President and General Manager of the Baltimore and Potomac and Alexandria and Fredericksburgh Railroads. Soon after becoming Assistant to the President of the Pennsylvania Railroad, he was made Third Vice-President and was entrusted with many of the important engineering duties incident to general construction work and especially with those connected with the survey, location and construction of new lines and branches.

As Second Vice-President, to which position he was elected in 1888, he also assumed the general charge of the treasury department of the company. He was in charge of this duty at the time of his death, December 17th, 1892.

Mr. Du Barry was either president, vice-president or director of over 100 different companies, besides acting as trustee for a number of others, in all of which he was highly esteemed for his integrity, great moral worth and business ability.

He became a Member of the American Society of Civil Engineers January 6th, 1875.

GEORGE W. DRESSER, M. Am. Soc. C. E.*

DIED MAY 27TH, 1883.

Major George W. Dresser was a native of Connecticut, and was appointed to a cadetship in the Military Academy at West Point, from Massachusetts, July, 1856. He was commissioned Second Lieutenant of the Fourth U. S. Artillery, May 6th, 1861, and during the ensuing two months was engaged in drilling the raw recruits at Washington. He entered the Manassas campaign as First Lieutenant, was engaged in the Battle of Bull Run and in the defense of Washington. He entered the Virginia Peninsular campaign in March, 1862, and was assigned to engineer duty at the siege of Yorktown. He was Acting Ordnance Officer of the Third Army Corps for two months. From September, 1862, to August, 1863, he was Assistant Instructor of Artillery Tactics at West Point, and from August to the close of the year he was assigned to engineer duty in the Fourth Regiment of Artillery, at Chattanooga, Tenn.

From July, 1864, to March, 1865, he was Inspector of the Fifth Army Corps, and for the ensuing four months was on detached service with General W. F. Smith. He was brevetted Captain in August, 1864, for gallant services during the operations on the Welden (Va.) Railroad, and Major in March, 1865, for good conduct and gallant services during the Rebellion. In October, 1865, he resigned from the Army and entered upon the practice of his profession as civil engineer. He took part in the survey of Block Island breakwater and the defenses of Narragansett Bay, in 1866 and 1868. He was afterwards Resident Engineer of the Harlem River and Port Chester Railroad, Chief Engineer of the Wickford Branch Railroad, and Assistant Engineer in the Department of Public Works, New York City. He acted for a time as Secretary of the Society of Gas Lighting, and was an Honorary Member of the British Association of Gas Managers. He was editor of the *American Gas-Light Journal* from October, 1875, until his death, May 27th, 1883. He was made a member of the American Society of Civil Engineers July 5th, 1876, and was a Director for the year 1882.

Major Dresser married the daughter of Daniel Leroy, a well-known resident of New York City.

* Abstracted from the Journal of the Society of Gas-Lighting, 1883.

LIST OF MEMBERS.

ADDITIONS.

		Date of Membership.
MEMBERS.		
BAKER, IRA OSBORN	University of Illinois, Champaign, Ill	May 3, 1893
LUM, DAVID WALKER	Chief Engineer East Tennessee, Virginia and Georgia Ry., Knoxville, Tenn	May 3, 1893
TIMONOFF, VSEVOLOD EVGUENIEVITCH	6 Quai de l'Amiranté, Log 34, St. Petersburg, Russia	May 3, 1893
ASSOCIATE MEMBERS.		
BURCHARD, ANSON WOOD	Box A, Danbury, Conn	May 3, 1893
FREEMAN, ERNEST GREY	P. O. Box I, Alton, Ill	May 3, 1893
HANNA, JOHN VENABLE	K. C. M. & B. R. R. Station, Memphis, Tenn	May 3, 1893
HILL, EDWIN ALLSTON	Room 91, Central Union Station, Cincinnati, O.	May 3, 1893
MILLER, SHREWSBURY BEAUREGARD	13 West 20th St., New York City	Jan. 4, 1893
MOSSCROP, ALFRED MILTON	Assistant Engineer Rochester Bridge and Iron Works, Rochester, N. Y.	J. May 4, 1887 A.M. May 3, 1893
SHERRERD, MORRIS ROBESON	City Engineer, City Hall, Troy, N. Y.	May 3, 1893
WILEMAN, ERASMUS DARWIN	Toledo, O	May 3, 1893
ASSOCIATE.		
SAEGER, CHARLES MARSHALL	9 South Fifth St., Allentown, Pa	May 2, 1893
JUNIORS.		
BELL, ALFRED CARROLL	101 19th St., Milwaukee, Wis	May 2, 1893
FOYÉ, ANDREW ERNEST	163 West 79th St., New York City	May 2, 1893
GRIGGS, DAVID CULLEN	36 College Place, Waterbury, Conn	May 2, 1893
NICHOLS, CHARLES HENRY	121 Meadow St., New Haven, Conn	May 2, 1893
POTTER, WINFIELD SCOTT	409 East Church St., Elmira, N. Y	May 2, 1893
SPENCER, WALTER TUTTLE	Guilford, Conn	May 2, 1893

CHANGES AND CORRECTIONS.

MEMBERS.

ALLEN, KENNETH.....Dept. of Public Works, Yonkers, N. Y.
BODFISH, S. H.....606 F St., Washington, D. C.
BRAMWELL, GEORGE W.....145 Broadway, New York City.
BREITHAUPT, WILLIAM H.....Alton, Ill.
BRINCKERHOFF, A. G.....Supt. of Works Johnson and Morris, 239 South Fifth Ave., New York City.
CUNNINGHAM, D. W.....Kelso, Traill Co., N. D.
HAZLEHURST, GEORGE B.....Catonsville, Md.
HODGES, ARTHUR.....P. O. Box 371, Newtown Centre, Mass.
JEWETT, WILLIAM C.....Brooklyn Village, O.
KEITH, HERBERT C.....Chief Engineer's office, N. Y., N. H. & H. R. R., New Haven, Conn.
KENNEDY, WILLIAM H .....(Care B. F. Bush), Burke Bldg., Seattle, Wash.
LEDLIE, CHARLES H.....Rialto Bldg., St. Louis, Mo.
MAXIM, HIRAM S.....Baldwin's Park, Bexley, Kent, England.
MCCOOL, DANIEL .....Second Vice-President Missouri Car and Foundry Co., 509 Chestnut St., St. Louis, Mo.
MITCHELL, HENRY.....Nantucket, Mass.
MOSMAN, A. T.....Assistant Coast and Geodetic Survey, San Diego, Cal.
NORTHRUP, H. F.....Monroe, Mich.
OSBORN, FRANK C.....721 Hickox Bldg., Cleveland, O.
PORTER, A. H.....1021 Security for Savings Bldg., Cleveland, O.
POWELL, CHARLES F..... Captain Corps Engineers U. S. A., District Bldg., Washington, D. C.
ROBINSON, A. W.....Chief Engineer Bucyrus Steam Shovel and Dredge Co., Milwaukee, Wis.
ROBINSON, G. H.....Mammoth Mining Co., Mammoth, Utah.
SMITH, S. HARRISON.....20 Ellis St., San Francisco, Cal.
WAGNER, SAMUEL TOBIAS.....P. O. Box 273, Phœnixville, Pa.
WAIT, JOHN C.....Editor The Car Builders' Dictionary, 73 Broadway, New York City.
WATKINS, F. W.....Carmel, N. Y.
YEATMAN, C. P.....Grand View, Tenn.

ASSOCIATE MEMBERS.

ALDEN, H. C.....Box 203, Carmel, N. Y.
GAHAGAN, W. H.....Laclede Bldg., St. Louis, Mo.
HEALY, JOHN F.....201 Dexter St., Seattle, Wash.
MITCHELL, EDWIN.....Assistant Engineer Baltimore & Cumberland Ry., Hancock, Md.
MODJESKI, RALPH.....760 Monadnock Bldg., Chicago, Ill.

ROSENBERG, FRIEDRICH.....P. O. Box 117, Philadelphia, Pa.
WILLARD, J. M.....Chief Engineer West Chicago Park and Boulevard System, Union Park office, Chicago, Ill.

JUNIORS.

BARNSLEY, G. T.....(Care J. W. Jones), Olney, Md.
CREUZBAUR, R. W.....Assistant Engineer Finance Dept., Room 5, Stewart Bldg., New York City.
IRWIN, J. C.....N. Y. C. & H. R. R. R. Station, Utica, N. Y.
JEWETT, WILLIAM B.....Assistant Engineer Sewer Commission, New Rochelle, N. Y.
LAWTON, PERRY.....39 Washington St., Quincy, Mass.
LENTILHON, E.....Pier 36, North River, New York City.
MCFARLAND, B. W.....420 Temple St., New Haven, Conn.
MILLARD, CURTISS.....Supt. C. S. & N. R. R., Sumpter, S. C.
RAASLOFF, HAROLD E. DE.....Kennewick, Wash.
SJÖSTROM, J. L.....Lawrence, Mass.
TALLON, JOHN J.....1010 Willow Ave., Hoboken, N. J.
TYRELL, H. G.....97 Bassett St., New Britain, Conn.
WALKER, ELTON D.....447 Rialto Bldg., Chicago, Ill.

DEATH.

LOCKE, AUGUSTUS WOODBURY.....Elected Member June 7, 1882; died May 14, 1893.

ADDITIONS TO
LIBRARY AND MUSEUM.

From American Institute of Mining Engineers:
- Additional Notes on the Prismadic Stadia Telescope.
- A New Form of Furnace for Roasting and Oxidizing Ores.
- Hot-Blast Stoves
- Note on Unfreezable Dynamite.
- Notes on the Lease or Tribute System of Mining as Practiced in Colorado.
- Proceedings of the Sixty-fourth Meeting, Montreal, Canada, February, 1893.
- The Basic Bessemer Plant of the Pottstown Iron Co.
- The Biwabik Mine.
- The Big Stone Gap Coal Field.
- The Development of Technical Societies.
- The Geological Map of the United States.
- The Greene-Wahl Process for Manufacturing Manganese and Alloys of Manganese Free from Carbon.
- The Half-Moon Mine, Pioche, Nev.
- The Manufacture of Charcoal Iron from the Bog and Lake Ores of Three Rivers District, Province of Quebec, Canada.
- The Phosphate Mines of Canada.
- The Use of Producer-Gas for Drying and Roasting Ore at the Lixiviation Mill of the Holden Smelting and Milling Co., Aspen, Col.

From Association of Engineers, Roanoke, Va.:
- Transactions No. 2, July, 1891, to March, 1893.

From Harry Bean, Brooklyn, N. Y.:
- John E Dubois *vs.* New York and Brooklyn Bridge Co.

From Boston Public Library:
- Annual Report of the Trustees for 1892.

From Cornell University, Ithaca, N. Y.:
- Library Bulletin, Vol. III, No. 3.

From J. Dees, Glasgow, Scotland:
Description of 130-ton Crane Seat and Steam Crane on Finnieston Quay, Glasgow Harbor, 1893.

From Dyckerhoff & Söhne, Amöneburg, Germany:
Protokoll der Verhandlungen des Vereins Deutscher Portland Cement Fabrikanten, 3ten und 4ten März, 1893.

From Institute Mechanical Engineers:
Proceedings, October, 1892.

From Lake Shore and Michigan Southern R. R.:
Twenty-third Annual Report, 1892.

From Harvey Linton, Altoona, Pa.:
Annual Reports of the City Engineer of Altoona, Pa., for the years 1891 and 1892.

From Massachusetts Board of R. R. Commissioners, Boston, Mass.:
Twenty-fourth Annual Report, 1892.

From Minister of Public Works, Paris, France:
La Navigation aux États-Unis. Rapport de Mission. Renseignements Historiques, Financiers, Descriptifs et Statisques sur les Ports et les Voies Navigables.

From Ministerio de Fomento, Caracas, Venezuela:
Exposicion que el Ministro de Fomento presenta al jefe del poder ejecutivo nacional en 1893.

From George S. Morison, Chicago, Ill.:
Plans of the Alton Bridge, St. C. M. & St. L. B. R. R.

From Pennsylvania R. R. Co.:
Forty-sixth Annual Report, for 1892.

From M. de Polignac, Panama, through C. W. Haines, Philadelphia, Pa.:
Lithographic Map of a Projected Railway Location from David to the City of Panama.

From Leo von Rosenberg, N. Y.:
Fourteenth Annual Report of the Standard Consolidated Mining Co., for the year ending February 1st, 1893.

From Sanitary District of Chicago:
Proceedings, March 15th-22d, April 19th, 26th, 29th, 1893.

From William Sellers & Co., Philadelphia, Pa.:
The Modern Traveling Crane.

From Smithsonian Institution, Washington D. C.:
Proceedings and Addresses. Celebration of the Beginning of the Second Century of the American Patent System, at Washington, D. C., April 8th-10th, 1891.

From Smithsonian Institution U. S. National Museum:
Report of the U. S. National Museum for the year ending June 30th, 1890.
Proceedings. Vol. XIV, 1891.
Bulletin No. 40. The Published Writings of George Newbold Lawrence, 1844-1891.
Directions for Collecting and Preserving Insects, Reptiles and Batrachians, Birds, Molluscs, Birds' Eggs and Nests.
Notes on the Preparation of Rough Skeletons.

From R. H. Thomson, Seattle, Wash.:
Report of the City Engineer of the City of Seattle, 1892.

From U. S. Department of Agriculture, Weather Bureau:
Report on the Climatology of the Cotton Plant.

From U. S. Department of State:
Reports of the U. S. Commissioners to the Universal Exposition of 1889, at Paris.

From U. S. Navy Department:
Pilot Chart of the North Atlantic Ocean, May, 1893.

From U. S. Treasury Department, Bureau of Statistics:
Quarterly Report Relative to Imports, Exports, Immigration and Navigation. December 31st. 1892.

From U. S. War Department, Chief of Engineers:
Seventeen Specifications for the Improvement of Rivers and Harbors.

From the U. S. War Department, Chief of Ordnance:
Notes on the Construction of Ordnance, No. 61.

From George E. Waring, Jr., Newport, R. I.:
Report of the Sewers of Memphis, Tenn., March 3d, 1893.

From Herbert M. Wilson, Washington, D. C.:
Manual of Irrigation Engineering.

(*Table to be inserted at page* 357 *of the* TRANSACTIONS *for May*, 1893.)

TABLE SHOWING the Velocities of Water in Pipes, as Determined Experimentally by Dr. Lampe and F. B. Stearns, and as calculated, using the formula $V = C' \sqrt[m]{d^n h}$; with Comparisons of Results.

No.	Authority.	Date of Experiment.	Length of Pipe.	Diameter of Pipe.	Loss of Head due to Friction, in Feet.		Value of C in $V = C\sqrt{RI}$.	Mean Velocity, f. s.		Differences.	
					Per Foot. I.	Per Mile. h.		Deduced from Measured Flow, $V = \frac{Q}{A}$.	Calculated by Formula, $V = C' \sqrt[m]{d^n h}$	Absolute.	Percent.
1...	Dr. Lampe	October 1, 1870	$4\frac{1}{2}$ to 6 miles.	1.373 ft.	0.0005915	3.123	110.7	1.577	1.564	— 0.013	— 0.82
2...	"	" 8, 1870		1.373 "	0.001376	7.265	114.1	2.479	2.498	0.019	0.77
3...	"	March 19, 1871		1.373 "	0.00163	8.606	114.6	2.709	2.744	0.035	1.29
4...	"	October 17, 1869		1.373 "	0.00195	10.296	119.4	3.090	3.031	— 0.059	— 1.91
5..	F. B. Stearns	May 1, 1880	1 747.2 ft.	4.0 "	0.0003181	1.68	146.67	2.616*	2.327	— 0.289	—11.05*
6...	"	" 5, 1880	1 747.2 "	4.0 "	0.0007115	3.76	140.14	3.738	3.639	— 0.099	— 2.65
7...	"	April 26, 1880	1 747 2 "	4.0 "	0.0012206	6.44	142.11	4.965	4.905	— 0.060	— 1.24
8...	"	" 27, 1880	1 747 2 "	4.0 "	0.0018485	9.76	144.09	6.195	6.178	— 0.017	— 0.27
						Means, *including* "anomalous" result, No. 5... ...				0 067	— 1 985
						" *excluding* " " No. 5.....				0.035	— 0.69

*Mr. Stearns designated the result in the 5th experiment recorded in this table as "anomalous." We have *included* it, and then have *excluded* it, in determining means.—G.

ERRATA.—VOL. XXVIII.

The formula on page 353 should read—

$$V = C \sqrt[m]{(4R)^n I}$$
$$= C' \sqrt[m]{d^n h}$$

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XIX.—June, 1893.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to the Society.)

OF THE SOCIETY.

JUNE 7TH, 1893.—The Society met at 20 o'clock, Vice-President Brush in the chair; F. Collingwood, Secretary. Ballots were canvassed, and the following candidates were declared elected: As Members, Albert Safford Cheever, Fitchburg, Mass.; Richard Evans, Jamaica, N. Y.; Theodor G. Hoech, Washington, D. C.; George Hunt Hutchinson (elected Assoc. M. September 2d, 1891), Pittsburgh, Pa.; Walter McCulloh (elected Junior July 4th, 1888), Brewster, N. Y.; Elwood Mead, Cheyenne, Wyo.; Christian Peter Emil Swenson, Pittsburgh, Pa.; Robert Atwell Way, London, England; Emanuel A. Ziffer, Vienna, Austria. As Associate Members, William Frederic Behrens (elected Junior November 6th, 1889), Albuquerque, N. M.; Charles Robert Bettes (elected Junior October 1st, 1890), Hoboken, N. J.; Robert King Brown, Jr., Pittsburgh, Pa.; Arthur Powell Davis, Los Angeles, Cal.; Amory Prescott Folwell (elected Junior February 5th, 1890), Atlantic Highlands, N. J.; Arsène Perriliat, New Orleans, La.; Gerdt Henrik Vedeler, New York City.

The Secretary announced the election, by the Board of Direction, on June 6th, 1893, of the following candidates as Juniors: Howard Carter Baird, Phœnixville, Pa.; William Hershel Bloss, Prescott, Ariz.; George Lewis Christy, Chicago, Ill.; Harry Harwood Rousseau, Brooklyn, N. Y.; Abraham Bernard Samuelson, New York City.

W. H. Jaques, M. Am. Soc. C. E., then gave a lecture, illustrated by the stereopticon, on the "Manufacture of High-Power Ordnance, with Special Reference to the Wire-Wrapped Gun."

JUNE 21ST, 1893.—The Society met at 20 o'clock, O. F. Nichols, Director of the Society, in the chair; Charles Warren Hunt, Assistant Secretary, Secretary *pro tem.*

A paper by John A. Ockerson, M. Am. Soc. C. E., on the "Erosion of the River Banks of the Mississippi and Missouri Rivers," was read, and discussed by Messrs. Morison, R. S. Buck and O. F. Nichols.

OF THE BOARD OF DIRECTION.

JUNE 6TH, 1893.—Reports of Committees were received. The Committee on Information and Courtesy reported that it had corresponded with industrial establishments and Boards of Public Works, and that a map of the United States was now ready, together with printed information, to guide strangers in visiting such works.

An additional circular was ordered sent to members, urging further subscriptions towards defraying the expenses of the Society in connection with the World's Engineering Congress.

Applications for membership were considered.

JUNE 20TH, 1893.—An amended form of circular, to be sent to references given by applicants for membership, was adopted.

The Sub-Committee of the Board to consider the propriety of the adoption of a Code of Ethics by the Society, presented a report giving reasons for and against the adoption of such a code. The report was considered, and the arguments ordered to be submitted to the Society at the Convention, with the recommendation by the Board that no Committee on the subject be appointed.

Three applicants were elected as Juniors.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.			Date of Membership.
CHEEVER, ALBERT SAFFORD	Chief Engineer Fitchburg R. R., Fitchburg, Mass.		June 7, 1893
EVANS, RICHARD	Town Hall, Room 1, Jamaica, N. Y.		June 7, 1893
HOECH, THEODOR G	Technical Attaché Imperial German Legation, Washington, D. C.		June 7, 1893
HUTCHINSON, GEORGE HUNT	South Western Bridge and Iron Co., Fort Worth, Texas	A. M..	Sept. 2, 1891
		M.....	June 7, 1893
MCCULLOH, WALTER	7 Crick Block, Niagara Falls, N. Y.	J.....	July 4, 1888
		M....	June 7, 1893

		Date of Membership.
MEAD, ELWOOD	State Engineer, Cheyenne, Wyo	June 7, 1893
SWENSON, CHRISTIAN PETER EMIL	Keystone Bridge Works, 51st St. & A. V. R. R., Pittsburgh, Pa	June 7, 1893
WAY, ROBERT ATTWELL	14 Old Burlington St., W., London, England	June 7, 1893
ZIFFER, EMANUEL A	I Giselastrasse 9, Vienna, Austria	June 7, 1893

ASSOCIATE MEMBERS.

BETTES, CHARLES ROBERT	(Care Charles B. Brush), 1 Newark St., Hoboken, N. J.	J.	Oct. 1, 1890
		A. M.	June 7, 1893
BROWN, ROBERT KING, Jr	2 Carson St., S. S., Pittsburgh, Pa		June 7, 1893
BRYAN, KENNERLEY	2320 Druid Hill Ave., Baltimore, Md	J.	Mar. 5, 1890
		A. M.	Jan. 6, 1893
DAVIS, ARTHUR POWELL	U. S. Geological Survey, Los Angeles, Cal		June 7, 1893
FOLWELL, AMORY PRESCOTT	Norwich, N. Y.	J.	Feb. 5, 1890
		A. M.	June 7, 1893
VEDELER, GERDT HENRIE	308 Alexander Ave., New York City		June 7, 1893

JUNIORS.

BLOSS, WILLIAM HERSHEL	1253 Clay St., Topeka, Kans	June 6, 1893
BROWN, NIMROD WASHINGTON LONG	P. O. Box 473, Atlanta, Ga	May 2, 1893
MOORE, ERNEST CURTISS	37 Jefferson Ave., Brooklyn, N. Y	June 20, 1893
SAMUELSON, ABRAHAM BERNARD	112 Henry St., New York City	June 6, 1893
SIRRINE, JOE EMORY	Jackson Park, Chicago, Ill	June 20, 1893

CHANGES AND CORRECTIONS.

MEMBERS.

BACOT, WILLIAM S.....145 Broadway, New York City,
DEANS, JOHN S.....Chief Engineer Phœnix Bridge Co., Phœnixville, Pa.
DOANE, EDWIN A.....Hapeville, Ga.
FILLEY, H. H.....1326 Forest Ave., Kansas City, Mo.
FORCE, CYRUS G.....126 Ingleside Ave., Cleveland, Ohio.

GRANT, WILLIAM H.....Cor. Highland and Waller Aves., Yonkers, N. Y.
HARLOW, JAMES H..... 210 Times Bldg., Pittsburgh, Pa.
HODGES, GILBERT.....Grand View Ave., Medford, Mass.
HUGHES, WILLIAM M.....Prin. Assistant Engineer Metropolitan West Side Elevated Ry., 1313 Monadnock Bldg., Chicago, Ill.
JENKINS, W. D.....922 Equitable Bldg., Baltimore, Md.
MORSE, CHARLES J.....1615 Monadnock Bldg., Chicago, Ill.
NORTHRUP, H. F.....East Tawas, Mich.
PARTRIDGE, JOHN A.....518 Thirteenth St., N. W., Washington, D. C.
PATTERSON, J. C.....Prin. Assistant Engineer B. & C. Ry., Hancock, Md.
PEARSONS, GALEN W.....Fifth St. and Troupe Ave., Kansas City, Mo.
WATSON, WILLIAM P.....720 North Eleventh St., Seattle, Wash.
WROTNOWSKI, ARTHUR F.....Pass Christian, Miss.

ASSOCIATE MEMBERS.

ANGIER, W. E.....493 Forty-third St., Chicago, Ill.
BUCK, R. S.....18 Broadway, New York City.
BURCHARD, A. W.....Box A, Danbury, Conn.
GAHAGAN, WALTER H.....Troy, Ohio.
HEMMING, D. W.....1005 Park Ave., Baltimore, Md.
KERR, H. H.....Receiver First National Bank, Brady, Tex.
MAYER, AUG.....Pasadena, Cal.

ASSOCIATES.

HOWE, MALVERD A.....2008 N. Tenth St., Terre Haute, Ind.
WARDER, JOHN H.....617 Rand-McNally Bldg., Chicago, Ill.

JUNIORS.

BASCOME, W. R .....2305 Lucas Place, St. Louis, Mo.
FISH, J. C. L.....(Care Mrs. F. C. Slaght), La Porte, Ind.
HOYT, J. T. N.....132 Quincy St. Brooklyn, N. Y.
NYE, A. S., Jr .....Purdy's Station, N. Y.
PERKINS, P. S.....Assistant Engineer N. Y., N. H. & H. R. R., Providence, R. I.
POTTER, W. S.....531A Washington Ave., Brooklyn, N. Y.
SELBY, O. E .....511 Commerce Bldg., Louisville, Ky.
SHERMAN, C. W.....(Care Eben Sherman), Kingston, Mass.
SWEITZER, N. B., Jr.....(Care Gen. N. B. Sweitzer), Army and Navy Club, Washington, D. C.
TAPPAN, ROGER.....Ipswich, Mass.
WADA, YOSHICHIKA.....No. 39 Shimamura, Saigori, Gunba-ken, Japan.

DEATH.

FLYNN, PATRICK JOHN.....Elected Member, Feb. 4, 1891; died June 1, 1891.

ADDITIONS TO
LIBRARY AND MUSEUM.

From American Institute of Mining Engineers, N. Y.:
- A New Form of Furnace for Roasting and Oxidizing Ores.
- Notes on the Lease or Tribute System of Mining as Practised in Colorado.
- Observations on the Relation between the Chemical Constitution and Physical Character of Steel.
- List of Officers, Members, etc., May, 1893.

From L. E. Chapin, Canton, O.:
- Report of the Sewer Commissioners, Canton, O.
- Report of the City Officials (of Canton, O.) for the year ending March 17th, 1893.

From Eckley B. Coxe, Drifton, Pa.:
- Report of the Commission Appointed to Investigate the Waste of Coal Mining.

From Edison Electric Illuminating Co, N.Y.:
- Annual Report for 1892.

From Edwin Gilpin, Halifax, N. S.:
- Minerals of Nova Scotia.
- Nova Scotia in 1893.

From Edw. W. Howe, Boston, Mass.:
- Eighteenth Annual Report of the Board of Commissioners, Department of Parks, Boston, Mass.:

From Institution of Civil Engineers, London, Eng.:
- Abstracts of Papers in Foreign Transactions.
- Gas Power for Electric Lighting.
- Khojak Rope Inclines.
- Regulating the Rate of Filtration through Sand.

From International Congress of Interior Navigation, Paris:
- Summary Report of the Labors of the Congress
- Proces-Verbaux des Séances des Sections et Compte Rendu des Excursions.
- Considerations sur les Grands Barrages en Maconnerie.
- Tonage Electrique des Bateaux.
- Le Mariuier.
- Notes sur l'Amelioration du Mississippi.
- L'Escaut Maritime:
- Statistique Graphique des Passes de la Gironde et de la Garonne Maritime.
- Le Tage Portugais.
- Amelioration de la Voie Fluviale de Rotterdam à la Mer. Planches.
- Eighteen photographs of the articles exhibited at the Congress.

From W. H. Jaques, South Bethlehem, Pa.:
- Present Development of Heavy Ordnance in the United States.

From John Kennedy, Montreal, Canada:
- Annual Report of the Harbor Commissioners of Montreal for the year 1892.

From Midland Institute of Mining, Civil and Mechanical Engineers, Barnsby, Eng.:
- Proceedings, Vol. XIII, Part 119.

From North of England Institute of Mining and Mechanical Engineers, Newcastle, Eng.:
- Transactions, Vol. XLII, Part 3.

From Pasadena Mountain Railway Co.:
- Scenes on the Line of the Pasadena Mountain Railway.

From W. Carlton Regand, N. Y.:
- Map of the City of New York.

From Royal Commission for the British Section, Chicago Exposition:
- Official Catalogue of the British Section.

From Andrew Rosewater, Omaha, Neb.:
- Report of the City Engineer of Omaha, Neb., for 1892.

From M. Russell Thayer, Philadelphia, Pa.:
- In Memoriam, Wm. W. Thayer.

From U S. Department of State:
- Reports from the Consuls of the United States, No. 153, June, 1893.

From U. S. Navy Department:
- Pilot Chart of the North Atlantic Ocean, June, 1893.
- The American Ephemeris and Nautical Almanac for 1896.

From U. S. War Department, Chief of Engineers:
- Notes on Military Lock Gates. Professional Papers of the Corps of Engineers, U. S. A. No. 26.

From Victorian Institute of Surveyors, Sydney, N S W.:
- Notes on the Dookie and Katamatite Tramway.
- Report and Proceedings of the Intercolonial Conference of Surveyors, Melbourne, 1892.

From Weir Frog Co., Cincinnati, O.:
- Catalogue.

From Lebbeus B. Ward, Jersey City, N. J.:
- Proposed Act for Furnishing State Water Supply to the Municipalities of New Jersey.

From Yale and Towne Manufacturing Co., Stamford, Conn:
- Catalogue No. 14.

Unknown:
- Report of the Engineer Department of the District of Columbia for the fiscal year ending June 30th, 1892.

By Purchase:
- Handy List of Technical Literature. Parts V, VI.

BOOK NOTICE.

VENTILATION AND HEATING.

By John S. Billings, A.M., M.D., LL.D., D.C.L., 6½ x 9½ ins., cloth, pp. 500. The Engineering Record, New York, 1893.

The introductory chapter of this important work is on the utility of ventilation. This is followed by others on the history and literature of the subject; the composition of the atmosphere and its physical qualities, the conditions which make ventilation desirable or necessary, and the dangers from not attending to it; the relations of moisture in the air to ventilation and the quantity of air required; the forces concerned in ventilation and the methods for testing.

The subjects of heating and the various apparatus are next considered, together with the sources from whence air is supplied; also the subject of fresh air inlets and of foul air shafts etc. Then follows the ventilation of mines, of hospitals, barracks and asylums; ventilation of halls and assembly rooms and of various large public buildings, also the ventilation of theaters, churches, schools and dwellings. The last chapters treat of the ventilation of tunnels, railway cars, prisons, shops, stables and sewers, and of the cooling of air.

The volume is copiously illustrated, there being 210 illustrations of various sizes, giving details explanatory of the various chapters in the work and forming a valuable record of various works accomplished. There are numerous tables giving the amount of carbonic acid to be found in various localities on the earth's surface, and the variations of amount at different times. The amount of atmospheric ammonia as obtained by various authors, and the amount of moisture in the air under various conditions. Of the height of chimneys required for combustion, and the number of heat units required to heat the air under various conditions. Of the effect of fan ventilation in certain mines; of the effects of ventilation in various large buildings, and other important topics.

The volume closes with some very important remarks on the subject of contracts for heating and ventilating apparatus, showing that the method of obtaining and making contracts is not a good one and often produces unsatisfactory results.

The recognized position of the author as an expert in sanitary matters should commend it to the attention of all sanitary engineers.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XIX.—July, 1893.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to Members.)

OF THE SOCIETY.

Business meeting held during the Annual Convention of the Society, at Chicago, Ill., Wednesday evening, August 2d, 1893.

President William Metcalf in the chair.

The PRESIDENT.—The Society has ordered, or requested this year, that a rather new method of appointing the Nominating Committee should be adopted. The plan is as follows (see Vol. XIX, page 8 of *Proceedings*):

The objection that the Chair sees in this arrangement, which otherwise is very good, is this, that if we have one district that has not five corporate members present, there is no provision whatever for appointing a member of the Nominating Committee from that district. I think it would be the sense of the Society that, if such a state of things should occur, the adjourned meeting will receive the report of the chairman of that district and proceed to elect, in the best way possible, the member from that district, based upon the report of the chairman.

L. L. BUCK, M. Am. Soc. C. E.—That was the intention, that the Convention should make the nomination and have the election of the Nominating Committee.

The PRESIDENT.—That will do very well. Undoubtedly they will act on the recommendation of those gentlemen who have had interest enough to be present.

The Chair will now ask that all members of Section No. 1 rise to their feet.

C. B. BRUSH, M. Am. Soc. C. E.—Mr. President, as I understand it, a man is accredited to a district in accordance with his address on the register; not where he lives, but where his address is on our record.

Mr. BUCK.—That covers New Jersey.

Mr. BRUSH.—No, it does not; as I understand this, District No. 1 is New York City and that part of New York State within 50 miles. New Jersey is out.

The PRESIDENT.—The gentleman is correct. Will the members from New York City or New York State within 50 miles from New York rise to their feet? (The members of District No. 1 arose.)

The remaining districts were called in like manner. The President then read the rule, and, in accordance with it, appointed as temporary chairmen the following gentlemen:

District No. 1, George Devin; District No. 2, Thomas H. McCann; District No. 3, C. Frank Allen; District No. 4, D. J. Lucas; District No. 5, R. W. Hunt; District No. 6, J. A. Ockerson; District No. 7, William Starling.

The Secretary delivered to each chairman the communications received from his district.

The PRESIDENT.—The gentlemen will please proceed to their duties and report on Friday evening.

Mr. BRUSH.—I move that when we adjourn, we adjourn to Friday evening, at this place, at 8.30 o'clock. (This motion was seconded and carried.)

What will be the other business of the meeting? Are we now to retire and agree upon a nominating committee, and then are we to meet again? I ask because there is some other business I want to bring before the meeting.

The PRESIDENT.—The judgment of the Chair would be that the intention and object of this plan, which is now on trial, was to give the chairmen of the different districts time to call their members together, not in an interval of this meeting, to act hastily, but to take time to call the meeting and go over the matter carefully and present the report to the Secretary. It would facilitate the business of this meeting if the chairmen did not call the members out.

The next proper business before the meeting would be the reports of committees. The Committee on Rail Sections I believe is ready to report, Mr. Hunt?

R. W. HUNT, M. Am. Soc. C. E.—Your Committee has succeeded in uniting almost unanimously upon its report and would ask that the report be accepted and the Committee discharged.

(Mr. Hunt read the report.*)

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* See Vol. XXVIII, Trans. Am. Soc. C. E., p. 425.

I have, sir, the honor also to present another communication from a member of the Committee which is, to a certain extent, a minority report; it is addressed to me as Secretary.

(Read the communication.*)

I would state, Mr. President, that the Secretary already has the material for the appendix and most of the work on the rail sections done. Your Committee has been devoting some months simply to those sections above 80 pounds in weight. I have with me a blue print which gives the weights covered by our final report. It is only fair to say that the action of the Committee was confirmed by a vote of a majority of its members. At present the report has not been submitted to all, and some may have some little differences to file, just as Mr. Morison has done; as far as agreement is concerned, I would respectfully move that the report be received and your committee discharged.

The PRESIDENT.—Gentlemen, you have heard the interesting report of the Committee, which, of course, is received with a resolution that the Committee be discharged, which resolution is now before you. Are there any remarks, or are you ready for the question?

(The motion was carried.)

I will read the circular concerning the matter of the appointment of a committee on ethics which is as follows:

"PROPOSED CODE OF ETHICS.

"At the Annual Meeting, January 18th, 1893, the following resolution was presented :

"'*Resolved*, That a special committee be appointed to collect information and to consider the propriety of the adoption by the Society of a code of ethics for the profession, and to make such other recommendation as the committee thinks proper.'

"This resolution was declared to be subject to the provisions of Section 13, Article VI, of the Constitution, and was, under those provisions, referred to the Board of Direction.

"The duty of the Board in such a case is declared by the Constitution as follows :

"'The Board shall consider the resolution and report its recommendations to the Society at the next general business meeting, together with a statement of the arguments for and against the appointment of such committee.'"

It is clear that the Constitution (Article VI, Section 13) makes it a little difficult to appoint a special committee, and requires a large approval of the Society to appoint a committee to act on any such subject. The Chair will assume that most of the members have read, or glanced at, the arguments prepared by the Board of Direction. The recommendation of the Board is on the last page.

* See Vol. XXVIII, Trans. Am. Soc. C. E., p. 428.

Is the meeting ready to take a vote on this question, or are any gentlemen desirous of speaking on the subject which is now before you for consideration?

J. B. JOHNSON, M. Am. Soc. C. E.—These papers, Mr. President, have just this moment been handed us, and every one has not had time to read them.

The PRESIDENT.—If it is desirable to discuss the question the Chair will read over the recommendations, *pro* and *con*, of the Board, and it can be taken up. It should have proper and careful consideration.

Mr. JOHNSON.—Could this matter come up at the next session, Friday evening?

The PRESIDENT.—No, sir; it is to be settled by a vote, requiring "a two-thirds vote of all the members present." That vote must be taken this evening. Perhaps it will take very little time; it will be just as well to read the recommendations of the Board.

(Read the report as follows):

"The Board of Direction herewith presents a statement of the arguments for and against the appointment of such committee to the Business Meeting of the Annual Convention.

"ARGUMENTS FOR THE ADOPTION OF THE PROPOSED RESOLUTION.

"1. The resolution is for the appointment of a special committee of this Society, to collect information and to consider the propriety of the adoption of a code of ethics, and to make such other recommendation as the committee thinks proper. This does not commit the Society to the adoption of a code of ethics, but simply proposes the appointment of a committee on this general subject. There should be no objection to the appointment of a carefully selected committee to consider the subject, and the members of the Society will certainly have larger information and be in a better position to determine as to the propriety or impropriety of the adoption of a code of ethics after the report of such a committee than without such report, the subject never having been carefully considered or presented as a Society matter.

"2. The difference of opinion on this general subject which evidently exists among engineers is a good reason for the appointment of the proposed committee, so that the subject may be presented for further consideration and discussion in a clear and definite shape.

"3. There seems to be some question as to whether civil engineering may properly be called a profession. A clear statement of what the word means is given by the "Century Dictionary," which defines a profession to be:

"'The calling or occupation which one professes to understand and to follow; vocation; specifically a vocation in which a professed knowledge of some department of science or learning is used by its practical application to affairs of others, either in advising, guiding or teaching them, or in serving their interest or welfare in the practice

of an art founded in it.' The same authority adds: 'Formerly, theology, law and medicine were specifically known as *the professions;* but as the applications of science and learning are extended to other departments of affairs, other vocations also receive the name. The word implies professed attainments in special knowledge, as distinguished from mere skill; a practical dealing with affairs as distinguished from mere study or investigation; and an application of such knowledge to uses for others, as a vocation, as distinguished from its pursuit for one's own purposes. In professions strictly so called a preliminary examination as to qualifications is usually demanded by law or usage and a license or other official authority founded thereon required.'

"This definition seems very clearly to apply to the actual facts of the practice of civil engineering. Men who have any right to be called civil engineers, and who have any right to be corporate members of this Society, do have a vocation in which a professed knowledge of some department of science or learning is used in practical application to the affairs of others. If the proposed committee finds it desirable it would doubtless recommend some means of carrying out or of enforcing regulations for such of the relations of engineers to their clients and to each other as could at all be made subject to rules. At all events, it is desirable that the committee should study this subject and report to the Society.

"4. Rules do exist which govern the relations, to each other and to the public, of men following other professions or vocations in which there are associations of the members of such profession or vocation in some respect similar to this Society. This applies, not only to the old so-called professions, but to other vocations. The dealers in stocks are subject to clear and definite rules, formulated and enforced through their exchanges. The dealers in produce are also subject to rules through their exchanges, and this is the case in other vocations.

"5. It will be well to appoint a committee to consider whether the dignity of civil engineering and the relations of members to themselves and to the public might not be improved by the application of rules of ethics or of conduct to be adopted by this Society as a representative body.

"6. It seems to be a fact that civil engineers do permit themselves in some few instances to act in ways which in other professions or vocations would be generally considered improper and unprofessional acts. Such acts are contrary to the rules of etiquette which have become standard in those professions. The appointment of a committee to see whether this can in any way be remedied as regards civil engineers is desirable.

"7. The lack of rules by which departures from the proper line and professional line of conduct can be judged affords excuses for unprofessional conduct when such conduct is based upon ignorance of, or indifference to, professional morals. The adoption of rules and

principles governing the relations of engineers to each other and to their clients would restrain the unprincipled and guide the ignorant.

"8. The fact that many engineers are engaged in salaried positions should be an argument in favor of, rather than against, the appointment of a committee to consider the possibility of a code which would add to the dignity of the profession. Those who require the services of engineers are apt to base their appreciation and estimate the value of those services upon the standing which the engineer himself takes. It is inconsistent with the function of this Society to depreciate engineering. It is its duty to endeavor to elevate it in every relation, and the appointment of the proposed committee will be a step in this direction.

"ARGUMENTS AGAINST.

"It is held that one may just as well assert that the other great professions are great in spite of their codes as because of them. Neither assertion can be proved. It seems to be a fact, however, that the lawyers have no formal code. Their rules of conduct are partly matters of tradition and partly of interpretation and construction, by various authoritative bodies, and form a valuable mass of professional ethics, but they have not been codified and adopted by the great Bar associations in the United States.

"Furthermore, one of the most important medical societies of the United States, the Medical Society of the State of New York, has voted to abandon its code of ethics. The fundamental reason for this action is summed up in these words of the president of that society: 'It would comport more with the dignity of the medical profession, and would enhance the respect in which it is held by the general public, if all specific rules of ethical conduct were elided from the by-laws of the State Medical Society, and if the regulation of such matters were hereafter left to the judgment of individual practitioners influenced by the well-known consensus of professional opinion and by local custom.'

"It is believed that the architects also are without a formulated and accepted code of ethics. So we see that the professions are either without codes or are beginning to abandon them. The rules governing the transactions of the stock and produce exchanges are not analogous to what is understood by a code of professional ethics; they provide simply for the carrying out of specific contracts, many of which are not enforcible by law, but the carrying out of which is vital to the existence of the business of the exchanges.

"It is held that it is impossible to frame a code of ethics that would cover all cases. Such a code would be too complicated and minute to be successfully administered. The code, therefore, must be merely a statement of general principles; but such statements have been made by moral teachers ever since society began, and the general principles which govern human conduct are sufficiently well formulated already.

"A strict code would restrain those who need no restraint, but it would not be regarded by the unprincipled further than their own interests dictated. It would happen sometimes, perhaps often, that an engineer would be deterred from doing his duty to his client or to himself by a timid obedience to the code, or that he would make the code an excuse for not doing disagreeable things which reflected upon the honor or capacity of other engineers.

"It is held that specific cases of violation of the traditions and spirit of the profession should be treated individually, each on its merits, and that this can be done, so far as the American Society of Civil Engineers is concerned, by presenting the case to the Board of Direction, or that a special body or committee can be created in the Society to perform this special function.

"The Board of Direction recommends to the Society that no such committee be appointed.

"By order of the Board.

"F. COLLINGWOOD,

"*Secretary.*"

The PRESIDENT.—The subject is now before you for discussion; what shall be done?

MANSFIELD MERRIMAN, M. Am. Soc. C. E.—As I understand the matter, the resolution that a special committee be appointed was presented at the Annual Meeting of the Society in January. I also understand that this business meeting has no power to act upon that resolution, that such a committee can only be appointed, that such a resolution can only be adopted, by the result of a letter ballot sent out to all the members of the Society, and that the question really before this meeting is whether such a letter ballot shall be issued or not. Is that the question?

The PRESIDENT.—The Chair will read the clause of the Constitution again, for the information of the members.

(Read "The Board of Direction shall," etc.).

The gentleman will see that the business is in the hands of this meeting and must be disposed of, under the Constitution.

Mr. MERRIMAN.—I think I am correct, then, in the idea that the whole question before this meeting is, shall the letter ballot be issued?

MENDES COHEN, Past President Am. Soc. C. E.—The only motion that is proper to be offered, under the Constitution, is a motion from some corporate member present that such letter ballot shall be issued. If there be no such motion made, the matter rests just where it is now; if there be such a motion made, under the Constitution, the question then comes before the Society in this meeting, and individual argu-

ments can be heard for and against it, and then a vote upon the question must find two-thirds of the corporate members present in the affirmative before such action can be taken. It is only if somebody here will make the motion.

The PRESIDENT.—That statement is perfectly correct and in accord with what the Chair stated.

Mr. MERRIMAN.—I move that it is the sense of this meeting that a letter ballot shall be issued. (Seconded.)

The PRESIDENT.—It is moved and seconded that it is the sense of this meeting that a letter ballot shall be issued on the subject; the matter is now before the members for discussion.

G. KAUFMAN, M. Am. Soc. C. E.—As this is a question of interest to all members of the Society, I don't think that a small meeting like this should vote this motion down; it would be better to have all the members vote upon this question.

JOHN C. TRAUTWINE, Jr., Assoc. Am. Soc. C. E.—Mr. Chairman, the arguments against are directed simply against the propriety of a code of ethics, not the appointment of a committee. The first argument in favor of the resolution points out that all that is asked is the appointment of the committee. The arguments against seem to be directed against the adoption of a code, not the appointment of a committee.

The PRESIDENT.—There certainly could be no objection to the appointment of a committee if there were no objection to the work the committee was to do. Are there any further remarks to be offered on the motion?

ROBERT MOORE, M. Am. Soc. C. E.—Mr. President, I wish to express my hope that the Society will not take any steps looking to legislation of this kind. I think that the conduct of members of the Society can fairly be left to their intelligence and their intention to do right, and I do not think that we should be put in the leading strings of legislation of this Society in that matter. I think the arguments in the negative of this question are sound, and I hope that no steps will be taken to inaugurate a hard and fast code of ethics such as seems to be contemplated by the proposition.

Mr. COHEN.—I would add but one word to what has already been said upon the subject. It appears to me that these codes of ethics, of which we hear so much and see so little—if you inquire you can scarcely find a written code of ethics, we do not see it in other associations—that a code of ethics must be governed by and formulated upon the good sense, good breeding and general comity of man to man. Now, as has been stated in this argument, such government will obtain—it has obtained and will obtain—among men of experience in the profession, men who are trained, men who are educated; and when, here and there, you will find an exception, some erratic course will be taken, it will be much easier to regulate that within the Society

if an extreme case arise, than to refer it to book. Ten to one there will be no case provided in the book, and then you have to go back to the Society in the end.

The only objection to the appointment of a committee to consider such a question is that it is dangerous to the Society to present to the committee such an argument and stir up a matter within the Society which, at best, can do no good to the Society and which may result in injury. I have no idea myself that even if such committee be appointed and it discuss the subject, and a letter ballot be issued, I have no idea that the Society would deliberately adopt such a course. If the view that I hold, and that I think a great many hold, is correct, then for the Society to adopt such a thing would be dangerous; it is a great deal better that it be not adopted and not considered.

A. Fteley, M. Am. Soc. C. E.—As an engineer of 25 years' standing in this country, I have been called upon, not only to perform regular duties, but I have very often been called to consult, alone or with others, on matters of importance; I have therefore had a great many experiences of various kinds. I have found in my case and in the case of others that a great many occasions arose in which the conduct of engineers was questioned. I have known of such cases where there was not the slightest reason for it. Those questions will arise, especially as to the relations of engineers and contractors; we know how much antagonism may arise. I have been a member of the Board a great many times. I have seen cases where the reception of a candidate into the Society has been fought by means fair and unfair. Sitting in the Board, I have seen our Secretary presenting to the Board stacks of letters against the reception of members simply because they have done certain things. Nine times out of ten we have found that such statements were made by interested parties who had an axe to grind, or who were taking their revenge upon somebody. It seems to me that if we submit a case like this to a code of ethics, in many cases the book will say nothing. We have duties to perform, and I suppose a great many of us try to perform them as well as we can. It seems to me that in cases of that kind a man must fearlessly follow the line of duty he believes he has to follow and let him stand by it or fall by it. It may happen once in a long while that a man may suffer unjustly, but in 99 cases out of 100 the man who is worthy, even though he has been attacked, will in the end triumph because he is a good man.

I am very proud of our profession. I know one thing by my experience in public works, and it is this: if an action has to be passed by certain authorities outside of engineering, I find that there must be the signature of this one and of that one before action can be taken; while we engineers generally put our signatures to very large sums, and it means simply that the money will be paid without question.

Consequently, why should we submit engineers who have such a high standing in the community to rules which will simply narrow the limits within which we are working. I believe it is an injustice; I believe it is an injury to our profession to try to bring us within such limits as this resolution contemplates.

The professions of the law, of theology, of medicine, have been mentioned. The gentlemen who belong to these professions, before they can practice, have to be accepted by certain authorities. We are not in the line of these conditions; we have a great many worthy men who have simply put their shingles out, and, in many cases, have made a success of it. Our profession cannot be compared to other professions. So far as I am concerned, I believe that this resolution is one that is likely to disturb the even tenor of our ways, and I emphatically say that we ought not to consider the idea of having a committee appointed for the purpose mentioned. (Question called for.)

The PRESIDENT.—Corporate members only can vote. Understand the question is, shall a letter ballot issue, or shall it not? A vote in the affirmative means that the Board shall ask the Society to vote on the appointment of a committee. A vote in the negative means that the whole matter is dropped here by the Convention. Those in favor of the issue of a letter ballot will please rise to their feet. (11 arose.)

All opposed will please rise to their feet. (54 arose.)

Eleven in the affirmative; 54 in the negative; the motion is lost.

H. G. PROUT, M. Am. Soc. C. E.—It seems that the Committee on Rail Sections was rather summarily dismissed, and, if in order, I would like to offer a resolution.

The PRESIDENT.—Any resolution is in order now.

Mr. PROUT.—As you know, that committee has worked for the past three and a half years with a great deal of ability and assiduity at this question, and it seems to me that they deserve some recognition of their labors. I would therefore offer this resolution:

"*Resolved*, That the American Society of Civil Engineers wishes to express its hearty thanks to the Committee on Rail Sections for the industry, zeal and ability with which it has served the Society and the profession, and the railroad and rail-making interests, in the very important work of designing a series of standard sections for rails."

The PRESIDENT.—Gentlemen, the resolution is before you for discussion, if any members have any remarks to make.

Mr. COHEN.—I move the adoption of the resolution. (Seconded and carried.)

The PRESIDENT.—Is there any further business to be brought before this meeting?

Mr. R. W. HUNT.—It is with some embarrassment that I say anything on rail sections after the very complimentary vote that you have seen fit to honor the committee with, but if you will permit me, on their

behalf, I would move that the Secretary be authorized to publish their report as belonging to the June *Proceedings*. That would keep it away from the mass of papers which will belong to this meeting and also get it before the Society much more quickly. And, really, this action was taken last winter; although the work has been going on all winter, it was simply owing to the fact that this meeting was in August, and not earlier, that the report was not submitted before. If in order, I would wish to make that motion.

The PRESIDENT.—It is moved and seconded that this report be issued as part of the June *Proceedings* of the Society.

G. S. MORISON, M. Am. Soc. C. E.—I would like to ask why the bulk of the report should not be printed as a part of the *Transactions* rather than the *Proceedings?*

The PRESIDENT.—The Chair is corrected; it should have said *Transactions*, not *Proceedings*. In the *Transactions*, to precede the transactions of this World's Congress and Convention combined.

CHARLES WARREN HUNT, M. Am. Soc. C. E.—It has been the practice to publisb reports in the *Proceedings;* and unless some action is taken, it would be published in the *Proceedings*.

Mr. R. W. HUNT.—I would suggest that the whole thing can be accomplished by publishing the report under the covers of the June *Proceedings*, simply bracketing in there "Adopted August the 2d," and its appearance there will at once show it as a mere matter of convenience, which is all I think that Mr. Hunt wants.

The PRESIDENT.—That would cover it. The motion really means that the Secretary be instructed to publish it in advance of the transactions of the World's Congress.

Prof. JOHNSON.—Ought it not to be published in the *Transactions* rather than in the *Proceedings*? They are bound separately, and, for my part, all I care to bind is in the *Transactions*.

The SECRETARY.—I would state that the previous report of this committee was published in the *Transactions*.

The PRESIDENT.—The question is, shall this report be published in the June *Transactions?* (Carried.)

It is so ordered. If any members have any business to bring before the meeting, this is the proper time.

Mr. C. B. BRUSH.—I do not know whether Past President Keefer is in the room or not, but this afternoon he told me that he thought it improbable that he would be able to be with us this evening, as he is lodging at some distance, and asked me to bring up the question as to whether it would not be practicable to make some arrangements whereby the different papers that have been presented to the different sections of this Congress could be obtained by the different members of each section. I think that the point he had in his mind was that each member should be presented with a copy of every paper presented.

Now, it is certainly a very important congress, and we have very important papers, and we ought to be able to know in some way if it is possible for us to obtain copies of all the papers that have been presented. Personally, I would like to have a copy of every paper that has been presented. In relation to our own division, every member will be presented with a copy of each paper presented to this division. I know of no arrangement whereby a member can get a copy of the papers presented to the other divisions, but think it will be possible to arrange a method by which this can be done. The expense might be very great. I would like to ask our Secretary what would be the cost of a volume, a bound volume, of the papers that have been presented to this division.

The SECRETARY.—We cannot print them in one volume. The actual cost of everything, setting up type, paper and printing, and without taking into account any of the copies which we have to send out to those who have furnished papers, will be fully $5 for each copy.

Mr. BRUSH.—In other words, the very minimum for which we can get out the papers that have been presented to this division alone, would be $5 per volume. Instead of $5 you will find it will be more than $5. There are seven or eight different divisions, and nobody knows how many members there are in some of those divisions.

The PRESIDENT—About 5 000 members.

Mr. BRUSH.—Therefore, if we send our papers alone to the members of these divisions it would cost us $25 000. That settles the question about our being able to furnish our papers to the other divisions; and it settles that question, that we cannot expect to receive their papers gratuitously. But while this is so, as a matter of fact, I believe nearly all these papers have been printed. I am not sure whether I am right or not. I don't know about the educational section. I do not know about all of the sections. I know that John Wiley & Sons have printed some of the papers for some of the sections, and I think the best thing for us to do is to determine and inform our members how those papers may be obtained, and at what price, and if they can be obtained at all, so that each member can place his order now, knowing he can get the paper if he pays a certain sum. I would suggest that a committee be appointed, or the Secretary be requested to obtain this information, and to inform our members how they can obtain copies of papers that have been presented to the other divisions.

FOSTER CROWELL, M. Am. Soc. C. E.—Might not that matter be referred to the Publication Committee?

The PRESIDENT.—The Chair can straighten that matter out in a moment. The committee appointed to arrange these matters has arranged for this also, and it has been clearly settled by the heads of the divisions that all of the papers in any division, or part of the papers, or any one paper, will be for sale at cost price, and all that any member has to do is

to apply to the secretary of any division and say what he wants, and the papers will be furnished at cost. That is the best that can be done, and our own Society agreed to furnish as many copies as may be needed at cost; that is the action of the General Committee and the heads of the departments.

Mr. C. W. HUNT.—If you remember, it was also decided that a copy of all papers published should be sent to all foreign and other societies represented here.

The PRESIDENT.—Of course every society will receive one copy; that is a matter of courtesy.

Mr. FTELEY.—Would not it be possible to obtain a list of the papers published by each division, and have this list sent to our members?

The PRESIDENT.—We understood that all the papers on the programme that you have in your hand are to be published. The Army engineers are getting their papers printed by the public printer; the chief of that division made his apology to-day, because they could not hurry the public printer; the Naval Division has had its papers printed—and beautifully printed—by the Messrs. Wiley. The Secretaries of the Mining and Mechanical Engineers stated that their papers would be published and at the service of every one calling for them in any division. It was understood and stated, at the meeting of the Committee, that all the papers on the programme will be published, unless it may be like some of the papers in Division A, under the statement, "The following papers have been received and will be presented by title," which papers certainly cannot be published or approved until they go through the regular channel of an examination by our Committee on Publications and our Secretary; but otherwise, it was clearly in the mind of the Chairman and of the representatives of the other societies that all the papers announced on this programme are to be published and can be purchased from the secretaries at cost.

J. A. OCKERSON, M. Am. Soc. C. E.—I would like to ask the members of District No. 6 to remain a few moments after adjournment.

The President requested the members of this district to remain, and the same request was made by the chairmen of the other nominating districts.

The PRESIDENT.—I wish to say that our business meeting is imperative. It was demanded that the time should be set over on account of the reception at the Mining Building, but the Chair decided that there was no authority on the earth by which this could be done after it was once announced to the members; but if the members will come promptly there is no reason why the meeting cannot be over in 15 minutes and those who desire can be down at the Mining Building by 9 o'clock.

Mr. CROWELL.—Would it not be better to change the hour to 8.

The PRESIDENT.—That hour of 8.30 has gone to every member in the

United States; some member may come in at that hour, and he has a right to expect to find the business meeting in session; there is no legal authority to change that hour.

I wish to announce further that if you will finish your business to-night as far as possible, the Chair will do everything to hurry the meeting on Friday night; and as it is desirable to read the President's address, the Chair will make a special announcement, that the Convention will meet at 8.15, and the Chair will take but 15 minutes to read his address, and then the business meeting can convene, and you can all be in the Mining Building by 9 o'clock.

A MEMBER.—It is suggested that 8.30 be eastern time.

The PRESIDENT.—If the Society so decides, the Chair will be on hand, and the Convention Session will be at 8.15, eastern time.

Seriously, if the members will come to the Convention Session at 8.15, the whole business can be finished in half an hour; but we must have our business meeting.

On motion, the business meeting adjourned to Friday evening at 8.30.

ANNUAL CONVENTION OF THE SOCIETY HELD AT CHICAGO, ILL., AUGUST 5TH, 1893.

The Convention met at 8.15 P. M. and was called to order by William Metcalf, President, who then delivered his annual address.*

Mr. Charles Macdonald offered the following resolution:

"*Whereas*, The American Society of Civil Engineers, in convention assembled, is desirous of expressing its hearty appreciation of the liberal and thoroughly efficient provision which has been made for this occasion, therefore, be it

"*Resolved*, That this Society tenders the warmest thanks to Messrs. Chanute, Whittemore, Strobel and their associates of the General Committee of the World's Congress, for the wisdom, skill and knowledge displayed by them in organizing the congress, which has resulted in bringing together the largest and most representative body of engineers the Society has ever witnessed and which will long live in the memory of all so fortunate as to be present."

This resolution was unanimously carried.

On motion, duly seconded, the Convention then adjourned.

ADJOURNED BUSINESS MEETING, HELD AUGUST 5TH, 1893, AT 8.30 P. M.

President Metcalf in the Chair.

The PRESIDENT.—The business meeting will now please come to order.

A motion to postpone the reading of the minutes will be in order. (This motion was offered and adopted.)

* See Trans. Am. Soc. C. E., Vol. XXVIII, p. 391.

The first business before the meeting is the election of the Nominating Committee. The Chair would call attention to the fact that the project for the election of the Nominating Committee, sent to this meeting this year, provides for a written ballot; that will take considerable time; it may not be necessary; the Chair would like the views of the meeting as to whether this shall be done or whether the election shall be by standing vote each time.

CHARLES MACDONALD, M. Am. Soc. C. E.—I move the election be by standing vote. (Carried unanimously.)

The PRESIDENT.—The first district reports that—

"The members of District No. 1 have decided upon the following corporate members to represent that district: Mr. G. S. Greene, Jr.; Mr. Charles H. Myers. "GEORGE DEVIN,

"*Chairman.*"

There will be no negative vote taken. The vote will be a standing vote, first for those who wish to have Mr. Greene for the member of the committee; next for those who wish to have Mr. Myers; the one receiving the highest number of votes will be elected.

All in favor of Mr. G. S. Greene, Jr., will please rise and remain standing while counted. (25.)

Those in favor of Mr. C. H. Myers will please rise and remain standing while counted. (5.)

Mr. Greene has 25; Mr. Myers, 5; Mr. G. S. Greene, Jr., is elected as member of the Nominating Committee from the First District.

District No. 2 reports as follows:

"The members of District No. 2 have decided upon the following gentlemen to represent that district: Mr. Clark Fisher, Mr. Coleman Sellers. "T. H. MCCANN,

"*Chairman.*"

(A rising vote was taken.)

Mr. Fisher has 15 votes; Mr. Sellers, 13; Mr. Clark Fisher is elected.

District No. 3 reports as follows:

"The five members of District No. 3 present the names of Fred. Brooks and Charles A. Allen for election as members of the Nominating Committee. "C. FRANK ALLEN,

"*Chairman.*"

(A rising vote was taken.)

Mr. Fred. Brooks has 18 votes; Mr. Charles A. Allen, 7. Mr. Brooks is elected.

District No. 4 reports as follows:

"The members of District No. 4 have decided upon the following corporate members to represent that district: Adolphus Bonzano, David E. McComb. "D. JONES LUCAS,

"*Chairman.*"

(A rising vote was taken.)

Mr. Bonzano has 16 votes; Mr. McComb, 8; Mr. Bonzano is elected.

District No. 5 reports as follows:

"The members of District No. 5 respectfully submit the following gentlemen as their choice to represent their district: C. L. Strobel, Professor C. E. Green.

"ROBERT W. HUNT,
"*Chairman.*"

(A rising vote was taken.)

Mr. Strobel's election is unanimous.

The Sixth District reports as follows:

"The members of District No. 6 have decided upon the following corporate members to represent that district: J. B. Johnson and Geo. H. Pegram.

"J. A. OCKERSON,
"*Chairman.*"

(A rising vote was taken.)

Mr. J. B. Johnson has 25 votes; Mr. G. H. Pegram, 8. Mr. J. B. Johnson is elected.

The Seventh District reports as follows:

"At the meeting of District No. 7, held after adjournment of the business meeting of the Society, at 9 P. M., the following corporate members were present: Messrs. Wm. Starling, Chairman; Jno. V. Hanna, Secretary; W. B. Storey, Jr., G. B. Nicholson, Emile Low.

"It was moved and seconded that the names of John McLeod and Rudolph Fink be presented to the Secretary of the Society as the choice of the members from the Seventh District for the Nominating Committee.

"J. V. HANNA,
"*Secretary.*"

(A rising vote was taken.)

A MEMBER.—I rise to a point of order. I think that Mr. John McLeod is now a member of the Board.

The SECRETARY.—No, sir; his term expired last year.

The PRESIDENT.—Mr. McLeod received 21 votes; Mr. Fink, 6. Mr. McLeod is elected.

That completes the election of the Nominating Committee, which is composed as follows: Messrs. G. S. Greene, Jr., Clark Fisher, Fred. Brooks, Adolphus Bonzano, C. L. Strobel, J. B. Johnson and John McLeod.

Is there any other business to come before the meeting?

On motion, the meeting then adjourned.

THE INTERNATIONAL ENGINEERING CONGRESS.

ORGANIZATION.

The Congress was divided into seven divisions, as follows:

Division "A"—Civil Engineering:
In charge of the American Society of Civil Engineers.
William Metcalf, President; F. Collingwood, Secretary.

Division "B"—Mechanical Engineering:
In charge of the American Society of Mechanical Engineers.
Eckley B. Coxe, President; F. R. Hutton, Secretary.

Division "C"—Mining Engineering:
In charge of the American Institute of Mining Engineers. E. G. Spilsbury, Vice-President; R. W. Raymond, Secretary.

Division "D"—Metallurgical Engineering:
In charge of the American Institute of Mining Engineers. Henry M. Howe, President; R. W. Raymond, Secretary.

Division "E"—Engineering Education:
In charge of Prof. Ira O. Baker, Chairman.

Division "F"—Military Engineering:
In charge of Major Clifton Comly, U. S. Army.

Division "G"—Marine and Naval Engineering:
In charge of Commodore Geo. W. Melville, Chief Engineer, U. S. Navy.

A general meeting of all the Divisions of the Congress was held in the Art Building, Chicago, on July 31st, 1893, at 10 A.M. The Congress was opened by a short address of welcome by Mr. Charles C. Bonney, President of the World's Congress Auxiliary.

Mr. O. Chanute, First Vice-Chairman of the General Committee of the World's Congress Auxiliary on Engineering Congresses, then made a brief address of congratulation and welcome. He noted with pleasure the presence of engineers from Great Britain, France, Germany, Austria, Hungary, Russia, Spain, Belgium, Holland, Denmark, Sweden, Norway, Italy, Mexico and the South American Republics, and from Australia and Japan. He then introduced successively Sir Benjamin Baker, of London, Vice-President of the Institution of Civil Engineers; Baron de Rochemont, Inspecteur-Général des Ponts et Chaussées, of Paris, France; Mr. C. O. Gleim, of Hamburg, Germany, representing the Associated German Engineering Societies; Mr. Hugo Koestler, representing the Austrian Society of Engineers; Mr. Alfred Nyberg, representing the Russian Imperial Society of Engineers, and Mr. Celso Capacci, Royal Italian Commissioner, all of whom made short and effective addresses.

Mr. Chanute then introduced Mr. William Metcalf, President of

the American Society of Civil Engineers, who addressed the Congress on behalf of Division "A" as follows:

"The facility of the engineers of Chicago is so well known that it hardly needs to be mentioned. It never was shown better than in their arrangements to-day; while they have given us so many delightful treats from our distinguished guests, they have notified the heads of departments that they are strictly limited to something less than five minutes. A wise man will not start out on any such rate.

"It gives me great pleasure, on behalf of the American Society of Civil Engineers, to extend to all foreign visiting engineers a hearty welcome from those of the United States. You will find in Chicago arrangements made to guide you in the easy pursuit of matters in which you have the most interest. You will also find, in the different cities of the country and in the hamlets, American engineers ready to receive you and to extend to you a hearty welcome. We wish you a happy and pleasant visit and, afterwards, a safe return home."

The chairmen of the other divisions were also introduced, and made brief addresses, after which the Congress was declared opened, and the general session adjourned, each Division to take up its own work in separate session.

Division A—Civil Engineering.

First Session, Monday, July 31st.—The meeting was called to order by the President, William Metcalf, who said:

"The Chair has been requested to announce as Honorary Presidents of Division A, Sir Benjamin Baker, of England; Baron Q. de Rochemont, of France; Mr. C. O. Gleim, of Germany; Mr. A. Nyberg, of Russia; Signor C. Capacci, of Italy, and Herr Von Littnow, of Austria-Hungary, and also the Presidents and Past Presidents of any engineering societies who may be present at this convention."

The Secretary, Mr. F. Collingwood, then read a short abstract of the first paper on the programme, "Navigation Works Executed in France from 1876–91," by F. Guillain, Inspecteur-Général des Ponts et Chaussées. The paper was discussed by Lieutenant King.

An abstract of the next paper, "Common Roads, Railways and River Communications in Portugal," by Frederico Augusto Pimental, was read by Charles B. Brush, Vice-President, M. Am. Soc. C. E.

The third paper, "The Rearrangement of the Railway Terminal System at Altona, with Special Reference to the Avoidance of Grade Crossings," by R. Caesar, Building Counselor to the Royal Prussian Government, was presented and discussed by Mr. C. O. Gleim.

The Session then adjourned to Tuesday at 9.30 A.M.

Second Session, Tuesday, August 1st.—President William Metcalf in the chair.

The Chair announced that, in order to get through with the large number of papers, it would be necessary to limit the time of each; that whenever there was no discussion on a paper the time gained would be given to the others.

George S. Morison, M. Am. Soc. C. E., then presented a paper on "The Continuous Superstructure of the Memphis Bridge," which was discussed by Messrs. G. H. Thomson, H. Goldmark, Sir Benjamin Baker and Mr. Morison.

A paper on "The Enlargement and Improvement of the North Sea Canal of Holland," by A. E. Kempees, C. E., Royal Engineer in Holland, and one on "Notes on Projects for the North Sea Canal from 1629–1893," by A. Huet, C. E., were presented, and discussed by Messrs. Fülscher, Gleim and Theodor Rehbock.

A paper on "The Manufacture and Testing of Portland Cement," by Henry Faija, M. Inst. C. E., was presented, and was discussed by Mr. J. P. Griffith, of England.

Mr. Max Gary then presented a paper on "The Testing of Portland Cement and the Development of the Cement Industry in Germany," which was discussed by Messrs. Whittemore, Lesley, Black and Sir Benjamin Baker.

A paper on "Bridge Superstructure and Foundations in Nova Scotia," by Martin Murphy, D. Sc., C. E., was presented. Written discussions on this paper by Messrs. E. Gilpin, Inspector of Mines in Nova Scotia; W. R. Butler, Assoc. M. I. C. E.; R. Sutherland, of Kentville, N. S.; and F. W. W. Doane, City Engineer, of Halifax, N. S., were presented.

An abstract of a paper on "Improved Method of Constructing Foundations Under Water by Forcing Cement into Loose Sand or Gravel by Means of Air Pressure," by Fr. Neukirch, was read by Mr. C. B. Brush; the paper was discussed by Mr. C. O. Gleim.

An abstract of a paper on "Topographic Surveys," by Herbert G. Ogden, Assistant U. S. Coast and Geodetic Survey, was read by Mr. Brush.

An abstract of a paper on "Terrestrial Magnetism in North America," by Charles A. Schott, Assistant U. S. Coast and Geodetic Survey, was presented by Mr. R. S. Woodward, and was discussed by Messrs. Goldmark, Woodward and Robert Moore.

A paper on "Historical Notes upon Ancient and Modern Surveying and Surveying Instruments," by H. D. Hoskold, Inspector-General of Mines, Argentine Republic, was presented by title, together with a letter from the author, and one on "Fundamental Units of Measure," by T. C. Mendenhall, Superintendent U. S. Coast and Geodetic Survey, was presented by title.

Mr. R. S. Woodward then presented a paper on "Recent Experience on the U. S. Coast and Geodetic Survey in the Use of Long Steel Tapes," which was discussed by Messrs. Wheeler, J. A. Ockerson, Robert Moore and C. B. Brush, after which the session adjourned.

THIRD SESSION, WEDNESDAY, AUGUST 2D.—President William Metcalf in the chair.

Abstracts of the first four papers, "The Treatment of Metals for

Structural Purposes," by James Christie, M. Am. Soc. C. E.; "The Use of Basic Mild Steel as Material for Construction in Germany," by C. Weyrich, Government Architect in Hamburg; "A Proposed Method of Testing Structural Steel," by Alfred E. Hunt, M. Am. Soc. C. E.; and "The Use of Mild Steel for Engineering Structures," by George C. Mehrtens, Government Architect, Bromberg, Prussia, were presented, and the papers were discussed by Messrs. Morison, L. L. Buck, A. E. Hunt, S. S. White, J. P. Griffith, C. O. Gleim, William Metcalf, G. H. Thomson, H. B. Seaman, William Kent, D. J. Whittemore, Robert Moore, R. S. Woodward, W. S. Pope, J. E. Greiner and James Christie.

Mr. E. Lee Heidenreich, Member of the Scandinavian Engineering Society of Chicago, presented a paper on "American Grain Elevators," which was discussed by Mr. E. B. Taylor.

Mr. D. W. Mead, Assoc. M. Am. Soc. C. E., presented a paper on the "Manufacture and Use of Paving Brick," which was discussed by Messrs. Calkins, Beahan and Albert Smith.

"Carbon and its Uses in Electrical Engineering," by Clarence M. Barber, C. E., was read by Mr. Charles Warren Hunt.

"Inland Transportation," by Captain F. A. Mahan, U. S. Army, was presented, and was discussed by Captain C. W. Raymond.

Captain William Murray Black, U. S. Army, M. Am. Soc. C. E., presented a paper on "The Improvement of Harbors on the South Atlantic Coast of the United States," which was discussed by Colonel William P. Craighill, Mr. E. P. North and Captain Black.

"The Electric Light Plant of Guadalajara," by Rafael M. de Arozarena, Member of the Society of Mexican Engineers and Architects, was presented by title.

"Practical and Æsthetic Considerations in the Laying Out of Cities," by F. Stübben, Royal Councilor of Buildings, Cologne, Germany, was presented, and discussed by Mr. James Dun.

"The Relative Merits of Working Hoisting Machinery by Steam, Water and Electricity," by George A. Goodwin, Assoc. M. I. C. E., was presented by title.

The President announced that a communication from a delegate of the French railroads had been received; a paper on "The National Railroad at Tehuantepec," by Manuel Rivera; and also a paper on the "Works under Construction for the Improvement of the Harbor of Vera Cruz," by Miguel A. de Quevedo; all were too late for presentation, and would be presented by title only. He also announced that a paper on "The North and East Sea Ship Canal," by Mr. Fülscher, which was not received in time to be properly laid before the Congress, would be presented by Mr. Gleim.

The President announced that Mr. Alfred Vander Stegen, a delegate from Belgium, had just arrived, and that his name would be added to the list of Honorary Presidents of Division "A."

The session then adjourned.

FOURTH SESSION, THURSDAY, AUGUST 3D.—President William Metcalf in the chair.

A paper, "On the Gauges of Railroad Track in General, with Special Consideration of Narrow-Gauge Railroads," by E. A. Ziffer, C. E., of Austria, was presented, and discussed by Messrs. H. G. Prout and F. Crowell.

"Transmission of Power in Operating Cable Railways," by Robert Gillham, M. Am. Soc. C. E., was presented by title.

"A New Method of Calculating Cross-Sections of Roads and Railroads," by Francisco da Silva Ribeiro, of Portugal, was presented by title.

"Distinctive Features and Advantages of American Locomotive Practice," by David L. Barnes, M. Am. Soc. C. E., was presented by the author, and discussed by Mr. Cohen.

"Railway Signaling," by G. Kecker, of Germany, was presented, and discussed by Messrs. Gleim and Hardy.

"Surveys for Railway Location," by F. A. Gelbcke, Baumeister, Cologne, was presented in abstract by Mr. Gleim, and discussed by Mr. Hardy.

"History of the Conversion of the River Clyde into a Navigable Water-Way and the Progress of Glasgow Harbour from its Commencement to the Present Day," by James Deas, C. E., Engineer Clyde Navigation, was presented, and discussed by Colonel Nichols and Mr. Gleim.

Professor H. Engels, of Dresden, Germany, presented a paper on "The Limits Attainable in Improving the Navigability of Rivers by Means of Regulation," and it was discussed by Colonel King, Captain Black and Mr. Griffith.

"The Development of Quay Cranes in the Port of Hamburg," by Chr. Nehls, Hydraulic Director of Hamburg, was presented in abstract by Mr. Gleim.

"The Plant of Maritime Commercial Ports of France," by H. Despres, C. E.; "Railroads in New South Wales," by Thomas F. Birrell, C. E.; "Study for Railways from Guadalajara to the Pacific Ocean," by S. V. Pascal, C. E.; "Railroads of Mexico," by E. Prieto Basave, C. E., were presented by title.

An abstract of a paper on "The Rearrangement of the Railway System at Cologne," by F. Lohse, was given by Mr. C. O. Gleim.

"Comparison of Modern Engine Loading with Standard Specifications for Spans from 10 to 200 ft.," by C. D. Purdon, M. Am. Soc. C. E., was presented, and discussed by Mr. Ward Baldwin.

The Chair announced that a paper on "The Sanitary Problem of Chicago," by L. E. Cooley, had just been received, and also a paper on "Rigid Arch and Suspension Bridges," by C. Kopcke, of Dresden.

The session then adjourned.

FIFTH SESSION, THURSDAY, AUGUST 3D, 8 P.M.—A lecture on "American Methods of Erection of Bridges and Structures," illustrated with stereopticon views, was delivered by Frank W. Skinner, M. Am. Soc. C. E.

SIXTH SESSION, FRIDAY, AUGUST 4TH.—President Metcalf in the chair.

The Chair read an invitation from the Board of Trustees of the Sanitary District of Chicago, to inspect the work under their direction.

"A Brief Account of the Building of Leixões Harbor," by Alfonzo Joaquin Nogueria Soares, was presented, and discussed by Mr. Griffiths.

Mr. Rehbock presented an abstract of the paper, "Description of the Lower Weser and its Improvement," by L. Franzius, Ober-Bau-Director, and the paper was discussed by Messrs. Rehbock, Gleim and Captain Black.

"Method Used to Secure the Stability of a Quay Wall at the Port of Altona on the Elbe in Germany, Which had Shifted its Position after Completion," by Berthold Stahl, Stadtbaurath, was presented, and discussed by Messrs. Peter Vedel and C. O. Gleim.

Abstracts of the next four papers, bearing upon the same general subject, were presented; these papers are "Purification of Sewage and of Water by Filtration," by Hiram F. Mills, A. M. I. C. E.; "The Sewerage System of Milwaukee, and the Milwaukee River Flushing Works," by G. H. Benzenberg, M. Am. Soc. C. E.; "Experience Had During the Last Twenty-five Years with Water Works Having an Underground Source of Supply," by B. Sahlbach, Government Engineer, Dresden, Germany; and "Some Questions Concerning the Filtration of Water," by W. Kümmel, C. E., Altona, Germany. Discussion on these papers followed, by Messrs. Brush, Hazen, Flad, Tribus, Whittemore, Hering, Drown, Benzenberg, Stearns, Moore and Jordan.

"Possibility of Increasing the Water Supply from the Soil for Purposes of Irrigation and of Augmenting the Flow of Rivers," by G. H. Otto Volger, of Germany, was presented, and discussed by Mr. C. O. Gleim.

A paper on "The Distribution of Water in the City of Mexico," by L. Salazar, was presented.

The Chair announced the list of papers which were to be presented by title, as printed on the programme.

"The Calculation of Railroad Bridge Stresses," by Jno. L. P. O'Hanly, M. Am. Soc. C. E; "The Tequixquiac Tunnel," by Luis Espinoza, M. Assoc. of Engs. and Architects of Mexico; "The New Railway Stations in Dresden," by C. Kopcke and O. Klette; "The Sewerage and Drainage of the Town of Coimbra," by J. C. DaCosta, J. da C. Couraca and J. F. de M. Bessa, Engineers; "The Improvement of the Harbor of Lisbon," by B. J. J. de Mattos; "A Method of Making Mountain Railways Economical," by Ugo Baldini, M. Society of Italian Engineers and Architects, Rome; "Determination of Uniform Methods

for Testing Building and Construction Materials," by J. Bauschinger. "The North and East Sea Ship Canal—History and Construction—Commercial and Military Aspects—The Baltic Lock—The Sand Dams in the Burg-Kudensee Lowlands," by Mr. Fülscher, Chief Executive Engineer and Member of the Canal Board; "The Best Form of Level Book," by A. T. Walmisley, M. Inst. C. E.; "On Rigid Arch and Suspension Bridges," by C. Kopcke, Dresden; "On the Desirability of a General Adoption by all Countries of a Uniform Method for the Tests of Materials of Construction," by M. Debray, Chief Engr. Ponts et Chaussées, General Secretary of the French Commission in Charge of Tests of Materials of Construction, etc., etc.; "Data and Observations of the Work under Construction for the Improvement of the Harbor of Vera Cruz," by Miguel A. de Quevedo, Member of Association of Engineers and Architects of Mexico; "The Channel Bridge," by L. Violette, Fellow of the Society of Civil Engineers of France.

The Chair also announced that copies of the papers presented to the different divisions of the Congress could be obtained at cost price from the secretaries of the different divisions.

The session then adjourned.

SATURDAY, AUGUST 5TH.—A final joint meeting of all the divisions of the Congress was held at 10 A.M., Mr. O. Chanute in the chair.

Each division was called upon for a brief summary of the work accomplished.

Mr. Metcalf presented a report from Division "A" as follows:

"Six sessions have been held, and the work accomplished can be best shown by the following statement: Sixty-three papers in all were presented. Of these fifty had been printed and distributed for discussion, and covered about 1 200 pages of printed matter, with numerous plates and cuts.

"The subjects treated may be classified under the following heads: "Common Roads; Railways, Terminal Systems, Signaling, Locomotives, etc.; Cable Railways; Bridges, Substructure and Superstructure; Canals; Foundations; Surveys and Surveying Instruments; Metals—Their Treatment for Substructural Purposes; Grain Elevators; Paving Brick; Carbon—Its Use in Electrical Engineering; Electric Light Plant; Hoisting Machinery; Inland Transportation; Navigation Works; Improvement of Rivers; Improvement of Harbors; The Plant of Commercial Ports; The Laying Out of Cities; Water Works; Sewers and Sewerage; Tunnels, and The Testing of Building Material.

"Twelve countries are represented in the authorship of these papers, as follows:

Germany furnished	20	Canada	3
Mexico	6	Italy	1
Portugal	5	Australia	1
England	3	United States	18
Holland	2		
France	2	Making a total of	63
South America	2		

"The work of translation of papers presented in foreign languages has been done in every instance by volunteers from the membership of the Society, by gentlemen thoroughly conversant with the subject under consideration.

"The interest manifested in the papers presented is evidenced by the fact that 318 engineers registered during the session of this Division, and the average attendance at each session was about 125.

"The discussions have taken a wide range, and, on account of the limited time, have been entirely confined to those presented orally. Many interesting and valuable written discussions were received, which it was entirely impossible to present at the sessions, but which will be published in connection with the papers.

"The number of valuable additions to the literature on the subjects mentioned is so great that it is impossible in this summary to do them all justice, and it is thought best not to attempt it.

"It may, however, be asserted that the results of the sessions of this Division of the Congress will be far-reaching and productive of great benefit to the profession of Civil Engineering all over the world.

"That statement is so clear and distinct that it is hardly worth while to add a word to it, except my testimony that in all the meetings of engineering societies which I have attended, I have never before witnessed such a steady, intelligent interest in this sort of work as we have had through the whole of this week."

The Chairman, Mr. Chanute, commented on the admirable work done by all the divisions, and then called upon the following delegates, each of whom responded briefly:

Baron de Rochemont, Professor Unwin, of London; M. Flamant, of France; Professors Hartman and Ruleaux, of Germany; Professor Nicholas Vosnessensky and Feliks Rycerski, of Russia; Signor Capacci, of Italy; Professor William Ritter, of Switzerland; M. Alfred Van der Stegen, of Belgium, and Jan Bergendal, of Sweden.

Baron de Rochemont offered the following resolution on the subject of international tests:

"*Resolved*, That a uniform system of testing materials is desirable for purposes of exact comparison."

The resolution was seconded and carried.

The Congress then adjourned.

The following 207 members were in attendance at the Convention and Congress: C. Frank Allen, Boston, Mass.; W. A. Aiken, John W. Alvord, Thomas Appleton, Samuel G. Artingstall, Chicago, Ill.; F. C. H. Arentz, Milwaukee, Wis.; D. M. Andrews, Lincoln, Ala.; Fred. Brooks, Boston, Mass.; William M. Black, Willet's Point; William S. Bacot, Charles B. Brush, L. L. Buck, William H. Burr, New York; George B. Burbank, Niagara Falls, N. Y.; C. W. Buchholz, Philadelphia; Adolphus Bonzano, Phœnixville; Arthur Beardsley, Swarthmore, Pa.; Ward Baldwin, G. Bouscaren, Cincinnati, O.; David L. Barnes, Charles E. Billin, V. G. Bogue, F. E. Butterfield, Chicago; Willard

Beahan, Streator; Ira O. Baker, Champaign, Ill.; George H. Benzenberg, Milwaukee, Wis.; Daniel Bontecou, Kansas City, Mo.; Holland W. Baker, Tacoma, Wash.; Fayette S. Curtis, New Haven, Conn.; F. Collingwood, Thomas C. Clarke, Foster Crowell, New York; William B. Cogswell, Syracuse; Charles L. Crandall, Ithaca, N. Y.; Mendes Cohen, Baltimore, Md.; Eckley B. Coxe, Drifton, Pa.; William C. Cushing, Indianapolis, Ind.; Robert L. Cobb, Springfield, O.; Frank A. Calkins, O. Chanute, Chicago, Ill.; William G. Curtis, San Francisco, Cal.; E. J. Chibas, Colon, U. S. Colombia; Stancliff B. Downes, New York; James E. Denton, Hoboken, N. J.; John B. Duncklee, Washington, D. C.; John Sterling Deans, Phœnixville; George Devin, Pottsville, Charles Davis, A. Dempster, Pittsburgh, Pa.; O. Erlandsen, New York; Franz Engström, Pittsburgh, Pa.; N. M. Edwards, Appleton, Wis.; H. N. Elmer, St. Paul, Minn.; George G. Earl, New Orleans, La.; William C. Edes, San Francisco, Cal.; John R. Freeman, Boston, Mass.; Wilbur C. Fisk, George H. Frost, A. Fteley, New York; Edward Flad, St. Louis; H. H. Filley, Kansas City, Mo.; John T. Fanning, Minneapolis, Minn.; Edgar B. Gosling, New York; Charles E. Goad, Toronto, Can.; Henry Goldmark, A. Gottlieb, Chicago, Ill.; Charles O. Gleim, Hamburg, Germany; Frank W. Hodgdon, Boston, Mass.; George R. Hardy, Charles M. Harris, Rudolph Hering, Clemens Herschel, Charles Warren Hunt, William R. Hutton, New York; Warren E. Hill, Greenpoint, N. Y.; W. Halleburton, Phœnixville, Pa.; Th. Hoech, Washington, D. C.; Alfred E. Hunt, Pittsburgh, Pa.; E. A. Handy, Cleveland, Ohio; W. C. Hawley, K. Emil Hilgard, Horace E. Horton, William M. Hughes, Robert W. Hunt, Chicago, Ill.; Charles Hermany, Louisville, Ky.; J. V. Hanna, Memphis, Tenn.; Arthur Hider, Greenville, Miss.; John F. Hinckley, St. Louis, Mo.; E. C. Jordan, Portland, Me.; John B. Johnson, St. Louis, Mo.; Paul S. King, Buffalo, N. Y.; Thomas C. Keefer, Ottawa, Canada; William D. Kelley, Jr., Kelley's Island, O.; G. Kaufman, Pittsburgh, Pa.; W. J. Karner, Alex. E. Kastl, Chicago, Ill.; Walter G. Kirkpatrick, Nashville, Tenn.; J. H. Kinealy, St. Louis, Mo.; H. G. Kelley, Texarkana, Tex.; James F. Lewis, G. Lindenthal, New York; D. Jones Lucas, Philadelphia, Pa.; Thomas J. Long, Buffalo, N. Y.; C. H. Lindenberger, Detroit, Mich.; Emile Low, Cedar Bluff, Va.; Olin H. Landreth, E. C. Lewis, Nashville, Tenn.; John Lundie, Chicago, Ill.; Charles F. Loweth, St. Paul, Minn.; M. L. Lynch, Fort Worth, Tex.; Harvey C. Lourie, Denver, Colo.; L. J. Le Conte, Oaklands, Cal.; Charles Macdonald, George W. McNulty, Spencer Miller, Aug. Mordecai, New York; Thomas H. McCann, Hoboken, N. J.; William M. Marple, Scranton; Mansfield Merriman, South Bethlehem; W. R. Michie, Tyrone; William Metcalf, Pittsburgh, Pa.; E. T. D. Myers, Richmond, Va.; John MacLeod, Louisville, Ky.; Robert E. McMath,

E. D. Meier, Robert Moore, St. Louis, Mo.; Daniel W. Mead, Rockford; William F. Merrill, Ralph Modjeski, George S. Morison, Charles J. Morse, Chicago, Ill.; Elwood Mead, Cheyenne, Wyo.; Edward P. North, New York; P. Elbert Nostrand, Brooklyn; A. S. Nye, Jr., Purdy's Station, N. Y.; George B. Nicholson, Covington, Ky.; Alfred Noble, William R. Northway, Chicago, Ill.; E. E. Olcott, New York; James Owen, Newark, N. J.; Frank C. Osborn, Cleveland, O.; John A. Ockerson, St. Louis, Mo.; Charles Payne, Henry G. Prout, New York, N. Y.; J. Madison Porter, Easton; George W. Parsons, Steelton, Pa.; Willard S. Pope, Detroit, Mich.; Henry W. Parkhurst, Chicago, Ill.; Arthur Pew, Talbotton, Ga.; George H. Pegram, Omaha, Neb.; William Roberts, Waltham, Mass.; Richard P. Rothwell, New York, Palmer C. Ricketts, Troy, N. Y.; Samuel Rockwell, Toledo, O.; Benjamin Reece, Thomas F. Richardson, A. F. Robinson, Chicago, Ill.; S. Bent Russell, St. Louis, Mo.; Frederic P. Stearns, George F. Swain, Boston, Mass.; Henry B. Seaman, Frank W. Skinner, Charles Sooysmith, New York; Charles W. Sherman, Ithaca, N. Y.; Ira A. Shaler, Ridgefield; E. Gybbon Spilsbury, Trenton, N. J.; William H. Searles, Cleveland, O.; Granville W. Shaw, Louisville, Ky.; William Starling, Greenville, Miss.; Max. E. Schmidt, Robert A. Shailer, E. C. Shankland, J. E. Sirrine, Robert I. Sloan, William Sooy Smith, A. C. Stites, Charles L. Strobel, Chicago, Ill.; William B. Storey, Jr., San Francisco, Cal.; E. K. Turner, Boston, Mass.; George H. Thomson, E. E. Russell Tratman, L. L. Tribus, New York; Robert H. Thurston, Ithaca, N. Y.; John C. Trautwine, Jr., Philadelphia, Pa.; George O. Tenney, Lytle, Ga.; A. N. Talbot, Champaign; A. M. Van Auken, Chicago, Ill.; Lee Treadwell, Kansas City, Mo.; A. J. Tullock, Leavenworth, Kans.; José R. Villalon, Santiago, Cuba; William Watson, C. J. H. Woodbury, Boston, Mass.; William H. Wiley, New York; Edward Wegmann, Jr., Katonah, N. Y.; Henry W. Wilson, Philadelphia; T. S. White, Beaver Falls; W. G. Wilkins, Pittsburgh, Pa.; E. D. Wileman, Cleveland; Charles E. Wells, Galesburg; C. A. Wilson, Toledo, O.; George Y. Wisner, Detroit, Mich.; Elton D. Walker, John F. Wallace, John H. Warder, Chicago, Ill.; N. O. Whitney, Madison; D. J. Whittemore, Milwaukee, Wis.; J. A. L. Waddell, Kansas City, Mo.

LIST OF VISITING ENGINEERS.

FROM THE UNITED STATES.

ARKANSAS.—*Fayetteville*—Prof. C. V. Kerr.
CALIFORNIA.—*San Francisco*—P. Dunn.
COLORADO.—*Denver*—G. C. Hewitt.
CONNECTICUT.—*Hartford*—H. G. Loomis.

ILLINOIS.—*Anchor*—C. B. Stewart ; *Chicago*—B. J. Ashley, L. L. C. Bartlett, R. C. Berkeley, Jr., Charles J. Best, C. E. Chester, B. B. Colburn, Lyman E. Cooley, F. Davis, J. H. Flagg, E. Lee Heidenreich, C. W. Hill, Irving Hitz, Theodore Kandeler, C. McLennan, Charles H. Nicollet, A. F. Parker, W. G. Potter, A. V. Powell, P. F. Randall, Warren R. Roberts, A. F. Roewade, Clifford C. Smith, W. L. Stebbings, Allan Străle, J. Thefring, J. H. Williams, G. V. Winslow, Albert H. Wolfe ; *Clinton*—D. W. Edmonston ; *Evanston*—Henry S. Maddock ; *Gibson*—C. B. McClure; *Hennepin*—W. W. Danley; *Lemont*—J. C. Beardsley, R. H. Bethel; *Peoria*—Jacob A. Harman; *Sycamore*—S. T. Armstrong; *Wayne*—W. J. Yoder.

INDIANA.—*Richmond*—Prof. Robert L. Sackett ; *Rochester*—L. V. Gould ; *South Bend*—Lewis S. Alter.

IOWA.—*Des Moines*—B. Schreiner.

KANSAS.—*Atchison*—Fred. Giddings.

KENTUCKY.—*Louisville*—Leonard M. Cox.

MASSACHUSETTS.—*Boston*—Prof. A. E. Burton.

MICHIGAN.—*Detroit*—J. H. Roberts ; *Grand Rapids*—G. S. Johnson.

MINNESOTA.—*Duluth*—A. R. Davis, J. E. A. Moore, Albert N. Smith.

MISSOURI.—*Chillicothe*—Percy C. Barney ; *St. Louis*—O. W. Ferguson, G. H. Johnson, C. D. Mitchell, H. Linton Reber.

NEW YORK.—*New York City*—J. W. Balet, W. Hildenbrand, A. J. Malakoff, R. S. Woodward ; *Troy*—James Burden, Alfred Berge.

OHIO.—*Cincinnati*—Adolph G. Wolff ; *Cleveland*—John Eisenmann.

PENNSYLVANIA.—*McKee's Rocks*—Karl von Wagner ; *Philadelphia*—J. M. Davis, J. A. McElmell, C. H. Satherberg ; *State College*—Prof. F. E. Foss.

TENNESSEE.—*Nashville*—H. W. Brennan.

WASHINGTON.—*Tacoma*—Richard Reiersen.

WEST VIRGINIA.—*Charlestown*—H. B. Davenport.

WISCONSIN.—*La Crosse*—M. J. Thompson ; *Madison*—W. L. Marcey.

FROM FOREIGN COUNTRIES.

AUSTRALIA.—*New South Wales : Sydney*—Hector Kidd, Robert Kuntsman.

AUSTRIA.—*Brünn*—Alfred Weber ; *Budapest*—Lewis Landau, A. Lovas, Mattausch Tivadas; *Vienna*—Adalbert Stradal, Prof. N. H. Bunsy, Ernst Lauda, Hugo Koestler, Prof. Josef Pechan, Robert von Reckenschuss, Herr Von Littnow.

BELGIUM.—Alfred Vander Stegen.

CANADA.—*Montreal*—E. A. Wallberg.

DENMARK.—*Copenhagen*—K. Christensen, Alfred Lütken, Olaf Mogensen, P. Vedel, O. Wolff.

ENGLAND.—*London*—Sir Benjamin Baker; *Yorkshire : Saetburn-by-the-Sea*—J. Coventry J'Anson.

FRANCE.—*Charleville*—M. Regaun ; *Havre*—H. Vétillart ; *Paris*—A. Caméré, M. Debray, A. Flammant, L. Violette, Lucien Périne, E. Rachalte, Baron Quinette de Rochemont, L. Vislett.

GERMANY.—*Amberg*—Herr Risser; *Berlin*—Herr Eger, Max Gary, Dr. G. Schmidt; *Bonn*—Dr. E. Gieseler; *Bremen*—Th. Rehbock; *Brunswick*—G. Menadier; *Carlsruhe*—Prof. D. H. Bunte; *Dresden*—Prof. Engels; *Frankfurt*—P. C. Ludwig Weber; *Kiel*—Herr Fülscher; *Königsberg*—Herr Wilhelms; *Hamburg*—H. Hagn, O. Berner; *Hanover*—Prof. G. Barkhausen; *Leipzig*—A. F. Schmiedt.

IRELAND.—*Dublin*—J. P. Griffith.

ITALY.—*Rome*—Celso Capacci, Prateri Attilio.

JAPAN.—*Tokio*—T. Yoshida.

MEXICO.—*Mexico*—Manuel Rivera.

NORWAY.—*Trondhjem*—Y. E. Gunstensen.

NOVA SCOTIA.—*Halifax*—Martin Murphy.

POLAND.—*Warsaw*—Feliks Rycerski.

RUSSIA.—*St. Petersburg*—Prof. W. Bernhard, Prof. Alexander Krupsky, P. D. Kuzminsky, Prof. A. Nyberg, Frank P. Roberts, Prof. N. Vosnessensky.

SWEDEN.—*Stockholm*—Aug. Dahlstrom, Harold Kenberg, J. L. Sebenius.

SWITZERLAND.—*Zürich*—Prof. W. Ritter.

MEMOIR OF DECEASED MEMBER.

JOHN ALBERT MONROE, M. Am. Soc. C. E.*

DIED JUNE 11TH, 1891.

John Albert Monroe, son of John S. and Louisa (Hunter) Monroe, was born in the town of Swansea, Mass., October 25th, 1836, his ancestors having come to this country in 1652.

His early education was obtained in the day schools of Fall River, and at the age of about thirteen he engaged in work in an office in Boston.

Two years later he went to the City of Providence whither his parents had previously removed, and, after attending the High School, learned the trade of a jeweler. Completing his apprenticeship he worked as a journeyman in that industry until he had accumulated a small sum of money, which enabled him to resume his studies. These he pursued alternately at the East Greenwich Academy and the University Grammar School in Providence, replenishing his funds as occasion demanded by working at his trade and teaching school.

* Committee appointed to prepare Memoir, J. Herbert Shedd, M. Am. Soc. C. E.; George C. Tingley, M. Am. Soc. C. E.; E. P. Dawley, M. Am. Soc. C. E.

In 1860 Monroe entered Brown University and held a high rank in his class, partly defraying his expenses while in that institution by serving as librarian to the Franklin Lyceum.

Though deeply interested in his University course, he was a warm lover of his country, and as he had, as early as 1854, joined the Providence Marine Corps of Artillery, and with great zeal and assiduity made himself familiar with the tactics of that branch of military service and attained high prominence in the organization, at the opening of the Civil War he gave himself to the service of his country, and was commissioned June 6th, 1861, Second Lieutenant, Battery A, First Rhode Island Artillery. Receiving rapid promotion through the ranks of First Lieutenant, Captain and Major, he was made Lieutenant-Colonel December 4th, 1862.

During his term of service in these grades he participated in 31 engagements, beginning with the scenes of Bull Run and terminating with the action around Richmond. He had four of his horses shot under him by shell and bullets, and he received a wound in his scalp.

Colonel Monroe was Chief of Artillery in McDowell's and Doubleday's Division and Hooker's Corps; commanding officer for more than a year of Artillery Camp of Instruction (Camp Barry), at Washington, D. C., the largest military post up to that time ever organized in the United States, where his services received the most flattering commendations; was Chief of Artillery, Second Corps Staff, Artillery Reserve of the Army of the Potomac; commanding officer First Division Artillery Brigade, Sixth Corps; Chief of Artillery, Ninth Corps; Commanding Artillery Brigade, and had charge of the entire artillery at the Battle of the Mine.

For his skill, gallantry and efficiency he received from Generals McDowell, King, Patrick, Doubleday, Hooker, Burnside, Gibbon and Heintzelman, in orders and reports, the highest expressions of praise and confidence, his command being spoken of and recognized as a model for drill and attainments.

Returning from the War, he adopted the profession of civil engineering, being for some time a student and assistant in the office of Samuel D. Cushing, Sr., of Providence, late member of the Am. Soc. C. E. In the winter of 1866–67, he made flowage surveys and assessed land damages for the reservoir of the Quidnick Reservoir Company in Kent County, R. I. In 1867, in conjunction with Mr. Cushing, he superintended the construction of the India Point Bridge for the Boston and Providence Railroad—the first bridge ever constructed with the "Cushing Pier" foundations, and in 1868 took charge of the construction of the Shore Line Railroad Bridge over the Connecticut River.

September 4th, 1869, he became a member of the Am. Soc. C. E.,

and during the continuance of his membership contributed important papers to its transactions.

Colonel Monroe's counsel was had in the west and south relative to the designing and construction of bridges over the Mobile, Texas, Illinois and Mississippi Rivers.

In 1872 he was on the Commission of Boundaries between Smithfield, Gloucester and Burrillville in Rhode Island, and had personal charge of the surveys connected therewith.

To Colonel Monroe belongs the credit of preparing the original draft of the legislative enactment now in force in the State of Rhode Island for the inspection of dams and reservoirs.

His opinion and services were highly esteemed and availed of in many questions of hydraulics and of tide waters.

Surveys and designs for the sewerage of Bar Harbor in Mount Desert, Me., were made by Colonel Monroe.

In October, 1879, he was appointed U. S. Assistant Engineer under the Mississippi Commission, and made complete hydrographic, topographic and geodetic surveys of the river from Cairo to Memphis.

For the New York, West Shore and Buffalo Railroad Colonel Monroe had charge, as Resident Engineer, of the construction of some of its most important and difficult works, notably those in the vicinity of Rondout and Kingston on the Hudson River.

On the completion of those works he went to Bismarck, Dakota, for which city he planned and constructed a system of water works.

Late in 1887 he, in connection with Mr. Alfred P. Boller, M. Am. Soc. C. E., engaged in work upon the plans for the Thames River Bridge of the New York, Providence and Boston Railroad, at New London, with special reference to the foundations, and in 1888 he was made Resident Engineer in charge of its construction, and retained that position until its completion and opening for travel October 11th, 1889.

It was Colonel Monroe's last great work, and by its successful accomplishment in the face of many and great difficulties he won an enviable reputation, especially as a substructural engineer.

Besides the work enumerated, Colonel Monroe was at various times during his professional career engaged in many others of less importance which it is not necessary to mention.

On July 1st, 1863, he married Mary Catherine Bodkin, of Alexandria, Va., who died in Providence several years ago, leaving him three daughters.

Colonel Monroe's death, which occurred in Providence, was directly produced by a hemorrhage proceeding from a cancerous growth in his left cheek, from which he had suffered constantly and intensely from about the time of his taking residence in New London as Engineer of the Thames River Bridge. It is needless to say that his sufferings were heroically endured, as became one of his indomitable energy and resolution.

Colonel Monroe was of a courteous and amiable disposition; kind, gentlemanly and sympathetic in all his intercourse with his fellows; possessed of a high sense of honor in matters of both private and professional life; of extraordinary power of application, which enabled and urged him to become master of every subject in which he became interested; and of a spirit of perseverance which allowed no obstacles to prevent the accomplishment of any design upon whose success he had determined.

Colonel Monroe's death at the age of fifty-five years may properly be regarded as a loss of no small magnitude to the profession which he so markedly honored; to the current literature of the day to which he made many and valuable contributions, and to the large circle of friends to whom he was endeared by his many admirable qualities of mind and heart.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

		Date of Membership.
FRITZ, JOHN	Bethlehem, Pa	July 5, 1893
MCKAY, JOHN EDWARDS	31 Chambers St., New York City	July 5, 1893
MUENSCHER, EMORY WASHBURN	Manistee, Mich	July 5, 1893
O'DONNELL, JOHN PATRICK	70 and 71 Palace Chambers, Westminster, London, England	July 5, 1893
OLCOTT, EBEN ERSKINE	18 Broadway, New York City.	July 5, 1893

ASSOCIATE MEMBERS.

BAINBRIDGE, FRANCIS HENRY	643 The Rookery, Chicago, Illinois	J. Jan. 4, 1888 A.M. July 5, 1893
MOORE, CHARLES HARRY	131 Academy St., Wilkesbarre, Pa	April 5, 1893

JUNIOR.

CHRISTY, GEORGE LEWIS	Governor's Island, New York Harbor, N. Y.	June 6, 1893

CHANGES AND CORRECTIONS.

MEMBERS.

BAKER, WILLIAM H.....Fitchburg, Mass.
BREITHAUPT, WILLIAM H.....P. O. Box 904, Alton, Ill.
BURR, WILLIAM H.....71 Broadway, New York City.
FOX, S. WATERS .....Hermann, Mo.
FULLER, FRANKLIN I.....Gen. Man. Portland Cable Railway, Portland, Ore.
GIBBS, C. W.....Newman Block, Durango, Colo.
KELLEY, WILLIAM D., Jr.....Kelley's Island, Erie Co., O.
LEDERLE, GEORGE A.....226 Commercial Bldg., St. Louis, Mo.
PEW, ARTHUR.....Chief Engineer M. G. & A. Ry., Talbotton, Ga.
RISER, K. S.....Whitney Opera House Block, Room 34, Detroit, Mich.
RITCHIE, JAMES.....719 Hickox Bldg., Cleveland, O.
TOMPKINS, J. A. B.....Milwaukee, Wis.
WELLS, CHARLES E.....Lock Box 596, Lima, O.

ASSOCIATE MEMBERS.

CAPLES, MARTIN J.....Norfolk & Western Ry., Bluefield, W. Va.
CUMMINGS, ROBERT A.....216 Equitable Bldg., Baltimore, Md.
MILLER, S. B.....28 West 20th St., New York City.

ASSOCIATES.

BOGART, S. S.....Electric Selector and Signal Co., 45 Broadway, New York City.
GOODELL, JOHN M.....175 Halsey St., Brooklyn, N. Y.

JUNIORS.

BYERS, MORTON L.....(Care C. & M. V. R. R.), Zanesville, O.
COMSTOCK, CHARLES W.....278 South Lincoln Ave., Denver, Colo.
HAMILTON, C. S.....(Care E. S. Davidson), N. Y., N. H. & H. R. R., Hartford, Conn.
HODGE, HENRY W.....55 West 33d St., New York City.
USINA, D. A.....Patent Office, Room 32, Washington, D. C.

DEATH.

SCHERZER, WILLIAM.....Elected Member Sept. 5th, 1888; died July 20th, 1893.

ADDITIONS TO

LIBRARY AND MUSEUM.

From Baldwin Locomotive Works, Philadelphia, Pa.:
Exhibit at the World's Columbian Exposition, Chicago, 1893.

From Boston Public Library, Boston, Mass.:
Bulletin, April, 1893.
Supplement to Bulletin. List of Books received from January 1st to April 15th, 1893.

From Canadian Society of Civil Engineers, Montreal, Can.:
Proceedings of Annual Meeting, February 23d, 1893.
Charter, By-Laws and List of Members, 1893.
Transactions, Vol. VI, Part II.

From J. J. R. Croes, New York:
Report on Salt Lake City Sewage Disposal.

From Mendes Cohen, Baltimore, Md.:
Report of the Commission to Investigate the Affairs of the Western Maryland Railroad Company.

From Director-General of Railways, Simla, India:
Administration Report on the Railways in India for 1892-93. Part I.

From A. B. Drake, New Bedford, Mass.:
Fourth Annual Report of the Board of Public Works, New Bedford, Mass., for 1892.

From Engineers' Club of St. Louis:
Local Engineering Data for St. Louis.

From Engineering Association of the South, Nashville, Tenn.:
Publication No. 5.

From Engineering News, N. Y.:
Sewage Purification in America.

From J. Foster Flagg, Brooklyn, N. Y.:
Description des Ponts de Neuilly, de Mantes, d'Orléans, et autres. 3 vols.

From Henry E. Gregory, N. Y.:
Ninth Annual Report of the Commissioners of the State Reservation at Niagara for the fiscal year from October 1st, 1891, to September 30th, 1892.

From Institution of Civil Engineers, London, Eng.:
Minutes of Proceedings, Vol. CXII.
Charter, List of Members, etc.

From Institution of Mechanical Engineers, London, Eng.:
Proceedings, February, 1893.

From Iron and Steel Institute, London, Eng.:
The Iron and Steel Institute in America in 1890.

From Gustav Kaufman, Pittsburgh, Pa.:
Lithograph of the Ferris Wheel, World's Columbian Exposition, Chicago, 1893.

From New York Meteorological Observatory, N. Y.:
Report for 1893.

From Patent Office, London, Eng.:
Patents for Inventions. Abridgments of Specifications, 1877-83.

From H. V. and H. W. Poor, N. Y.:
Poor's Manual of Railroads, 1893.

From Geo. Sherwood, Riverside, Cal.:
Riverside, Cal. The Home of the Orange.

From Saml. L. Smedley, Philadelphia, Pa.:
Annual Message of the Mayor of Philadelphia, with Reports of the Departments.

From Hamilton Smith, London, Eng.:
El Callao Gold Mining Company. Report of the Directors, 1892.
Superintendent's Report of the Alaska Treadwell Gold Mining Company, May, 1893.

From University of Minnesota, Minneapolis, Minn.:
The Year Book of the Society of Engineers.

From U. S. Department of the Interior, U. S. Geological Survey:
Mineral Resources of the United States, 1891.
Bulletins Nos. 82-86, 90-96.
Monographs XVII, XVIII, XX and Atlas.

From U. S. Department of Agriculture:
Report of the Chief of the Division of Forestry for 1892.
Certain Climatic Features of the Two Dakotas.

From U. S. Department of State:
Reports from the Consuls, July, 1893, No. 154.

From U. S. War Department, Chief of Engineers:
Nineteen Specifications for the Improvement of Certain Rivers and Harbors.

By Purchase:
The Official Directory of the World's Columbian Exposition.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XIX.—August, 1893.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to Members.)

OF THE SOCIETY.

JULY 5TH, 1893.—Pursuant to the resolution of the Board of Direction, the Tellers of the Ballot of June 7th, 1893, met and canvassed the ballot of this date, and Vice-President Brush declared the following candidates elected: As Members, William W. Follett, Denver, Colo.; John Fritz, Bethlehem, Pa.; John Edwards McKay, New York City; Emory Washburn Muenscher, Manistee, Mich.; Eben Erskine Olcott, New York City; John Patrick O'Donnell, London, England. As Associate Member, Francis Henry Bainbridge (elected Junior January 4th, 1888), Wilmington, Del.

AUGUST 2D AND 4TH, 1893.—See *Proceedings* for July, 1893. Vol. XIX, p. 121.

OF THE BOARD OF DIRECTION.

AUGUST 3D, 1893.—The Board met, as required by the Constitution (Art. VIII, Sec. 7), at the Annual Convention in Chicago.

Routine business only was transacted.

LIST OF MEMBERS.

ADDITIONS.

ASSOCIATE MEMBER.

		Date of Membership.
BEHRENS, WILLIAM FREDERIC	Civil Engineer and Surveyor, P. O. Box 676, Albuquerque, N. M...	J. Nov. 6, 1889 A.M. June 7, 1893

JUNIOR.

ROUSSEAU, HARRY HARWOOD	31 Sands St., Brooklyn, N. Y.....	June 6, 1893

CHANGES AND CORRECTIONS.

MEMBERS.

BARNARD, JOHN F.....Receiver Omaha and St. Louis Ry., Council Bluffs, Ia.
BOGUE, VIRGIL G.....638 Rialto Building, Chicago, Ill.
COBB, ROBERT L.....Chief Engineer Ohio Southern R. R., Springfield, O.
HUTCHINSON, GEORGE H.....Southwestern Bridge and Iron Company, Fort Worth, Tex.
KENNEDY, WILLIAM H.....611 Marquam Building, Portland, Ore.
KING, FRANK P.....Markham Hotel, Denver, Colo.
LELAND, GEORGE H.....174 Weybossett St., Providence, R. I.
LOW, GORHAM P.....Engineer Board of Public Works, Austin, Tex.
MAXWELL, JAMES R.....3709 Hamilton St., Philadelphia, Pa.
POTTER, HENRY W.....Whitehall, N. Y.
RICHARDSON, THOMAS F.....Principal Assistant Engineer Metropolitan Water Supply Company, 13 Beacon St., Boston, Mass.
ROSECRANS, WILLIAM S.....Brevet Major-General, U. S. A., Redondo, Cal.
YEATMAN, CHARLES P.....Cucuta, U. S. Colombia, *via* Red D Line.

ASSOCIATE MEMBERS.

BAINBRIDGE, FRANCIS H.....Western Representative Pencoyd Bridge and Construction Company, 643 The Rookery, Chicago, Ill.
BRYAN, KENNERLEY.....Chief Engineer Otis Bros. & Co., 38 Park Row, New York City.
HILL, EDWIN A.....(Care Hatch & Foote), 7 Pine St., New York City.
HYDE, A. LINCOLN.....28 Commonwealth Ave., Cleveland, O.

JUNIORS.

CLARKSON, ROBERT C.....118 Custom House Place, Philadelphia, Pa.
FISH, J. C. L.....Leland Stanford, Jr., University, Palo Alto, Cal.
KHUEN, R., JR.....Bridge Department, Pencoyd Bridge and Construction Company, Pencoyd, Pa.
KIBBE, AUG. S.....147 East Seventh St., Chester, Pa.
PURSLOW, ERNEST J. S.....San Bernardino, Cal.
ROEHM, GEORGE E.....Detroit Bridge and Iron Company, Detroit, Mich.
WILSON, C. W. S.....Assistant Engineer Sewer Commission, New Rochelle, N. Y.

RESIGNATION.

MEMBER.	Date of Resignation.
PETTIT, ROBERT E.....	Dec. 31, 1892.

BOOK NOTICE.

SEWAGE PURIFICATION IN AMERICA.

A Description of the Municipal Sewage Purification Plants in the United States and Canada. By M. N. Baker, Associate Editor *Engineering News*. 4½ x 7 ins., paper, pp. 196. Index, Table of Contents and 79 Illustrations. Engineering News Publishing Company, N. Y., 1893.

The articles from which this work has been made up were published during the past year in the issues of *Engineering News*. They have here been revised and classified according to the system of sewage purification adopted by the different cities. The classification embraces Intermittent Filtration, Broad Irrigation, Subsurface Disposal, Sedimentation, Mechanical Separation by Filtration, and Chemical Precipitation. Many subjects closely related to these are incidentally treated of, and many illustrations are given of the principal sewage plants in the United States.

A Table of Contents and a full Index add value to the volume which cannot fail to interest every engineer.

ADDITIONS TO

LIBRARY AND MUSEUM.

From American Institute of Mining Engineers:
Transactions, Vol. XXI, 1892-93.

From Boston Public Library:
Bulletin, July, 1893.

From College of Engineers and Architects, Palermo, Sicily:
Transactions, January-April, 1893.

From L. Franzius, Bremen, Germany:
Die Korektion der Unterweser.

From Institution of Civil Engineers, London, Eng.:
Abstracts of Papers from Foreign Transactions.
Breakdown of R. M. S. *Umbria*.
Bubble Blocks in Concrete Structures.
Beetaloo Water-Works, South Australia.
Electrical Railways.
Plant for Harbor and Sea Works.
Radial Valve Gears.
River Piers of the Tower Bridge.
Smelting Processes.
Strength of Cement Concrete.
Testing Engine Governors.
Thrust in Bend Pipes.

From Intercontinental Railway Commission, Washington, D. C.:
Report of the United States Delegates, July 21st, 1893.

From William Jackson, Boston, Mass.:
Twenty-sixth Annual Report of the City Engineer, Boston, Mass., for the year 1892.

From Claus Köpcke, Dresden, Germany:
Specifications for Railway Track, U. S. Patent Office.

From Lehigh University, South Bethlehem, Pa.:
Catalogue of Articles in the Exhibit at the World's Columbian Exposition.

From E. D. Meier, St. Louis, Mo.:
Helios.

From Rafael Mallen, Mexico:
Fusil Automatico de Repeticion.

From Gilbert Murdoch, St. Johns, N. B.:
Engineers and Superintendent's Report on Sewerage and Water Supply, St. Johns, N. B., for 1892.

From New York State Weather Bureau, Cornell University:
Report for June, 1893.

From Patent Office, London, Eng.:
Abridgment of Specifications.

From Sanitary District of Chicago:
Proceedings, pages 1332-1405

From Smithsonian Institution, Washington, D. C.:
Report of U. S. National Musem, for year ending June 30th, 1891.

From Société d'Encouragement pour l'Industrie Nationale, Paris:
Projets d'Unification des Filetages et des Jauges de Treflerie.

From Arthur N. Talbot, Champaigne, Illinois:
Rates of Maximum Rainfall.

From Technical High School, Berlin:
Programme, 1893-94.

From Technical High School, Aix-la-Chapelle:
Programme, 1893-94.

From Techninal High School, Hanover:
Programme, 1893-94.

From U. S. Department of Agriculture, Washington, D. C.:
Report of the Chief of the Weather Bureau, for 1892.
The Climate of Chicago.

From U. S. Department of State, Washington, D. C.:
Reports from Consuls, August, 1893.

From U. S. Bureau of Education, Washington, D. C.:
Benjamin Franklin and the University of Pennsylvania. Circular of Information, No. 2, 1892.

From U. S. Geological Survey, Washington, D. C.:
Eleventh Annual Report, 1889-90.

From U. S. Navy Department, Washington, D. C.:
War Series, No. 4—The Chilian Revolution of 1891.
Pilot Chart of the North Atlantic Ocean, September, 1893.

From U. S. Treasury Department, Bureau of Statistics, Washington, D. C.:
Quarterly Report, March 31st, 1893.

From U. S. War Department, Chief of Engineers:
Fifteen Specifications for the Improvement of certain Rivers and Harbors.

From U. S. War Department, Chief of Ordnance:
Report of the Chief of Ordnance for 1892.

From Verein Deutscher Ingenieure, Berlin:
List of Members, 1893.

From L. Violette, Paris, France:
Description of the Project for the Construction of a Bridge Across the English Channel.

Unknown:
Columbia, 1893.
Report of the Board to inquire into the Locomotive Branch of the Railway Department, Melbourne, Australia.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XIX.—September, 1893.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to Members.)

OF THE SOCIETY.

SEPTEMBER 6TH, 1893.—The Society met at 20 o'clock, Vice-President Brush in the chair; F. Collingwood, Secretary.

The Secretary announced the deaths of Ernest V. Clemens, elected Member March 1st, 1893; died September 3d, 1893; Patrick J. Flynn, elected Member February 4th, 1891; died June 1st, 1893; and William Scherzer, elected Member September 5th, 1888; died July 20th, 1893.

The paper by John A. Ockerson, M. Am. Soc. C. E., on "Erosion of River Banks of the Mississippi and Missouri Rivers," was presented for discussion, and written discussions were read by the Secretary from Messrs. Arthur Hider, William Starling, Samuel H. Yonge, Henry B. Richardson and H. M. Marshall.

A large party of French engineers was present. An address of welcome was made by Vice-President Brush, and appropriate responses by M. Louis Rey and M. Chasseloup Loubat.

SEPTEMBER 20TH, 1893.—The Society met at 20 o'clock, Director Foster Crowell in the chair; F. Collingwood, Secretary.

A paper on "The Water Works of Denver, Colo.," by James D. Schuyler, M. Am. Soc. C. E., was presented in abstract by the Secretary. A written discussion by R. C. Gemmel, Assoc. M. Am. Soc. C. E., was read, and the subject was orally discussed by Messrs. Kenneth Allen, A. Fteley, James Owen, Edward P. North, E. E. Olcott, L. L. Tribus, C. O. Gleim, J. D. Fouquet and R. L. Harris.

OF THE BOARD OF DIRECTION.

SEPTEMBER 5TH, 1893.—The following method of publication of the papers presented to Division A of the International Engineering Congress was adopted:

All papers presented to the International Engineering Congress, classified by subjects, will be published in the current numbers of *Transactions*, July to December, 1893 (inclusive).

The following scale of prices for the sale of these publications (with the usual discount to Members) was adopted.

For each number, $2. (Each number will average 266 pages.)

For each paper sold individually, at the rate of 1 cent per page.

For each complete set, in two volumes of 800 pages each, bound in cloth, $12.

Applications were considered and other routine business transacted.

MEMOIRS OF DECEASED MEMBERS.

DAVID A. STEWART, F. Am. Soc. C. E.

DIED DECEMBER 14TH, 1888.

David A. Stewart was born in London, near Chambersburg, Pa., in 1831. His father, General John Stewart, was the first passenger agent of the Pennsylvania Railroad in Pittsburgh, Pa.

The fact of his father's association with the Pennsylvania Railroad possibly influenced Mr. Stewart previous to 1860 to accept a position in the Freight Department in Pittsburgh, then in charge of George C. Franciscus, as freight agent, which had been offered him by his uncle, Thomas A. Scott, then in a prominent position in the road.

His bright and cheerful disposition and his capacity for work soon caused him to be advanced to more lucrative places, and when Mr. Franciscus resigned, Mr. Steward succeeded him as freight agent.

The development of the oil industry led him in 1863 to sever his connection with the Pennsylvania Railroad and to accept the position of President of the Columbia Oil Company, which was then organized.

In 1872, in connection with Mr. Carnegie and others, he founded the Edgar Thomson Steel Company, and was, until the time of his death, constantly associated with the Carnegie interests. When Mr. Henry Phipps, Jr., resigned as Chairman of Carnegie Brothers & Company, Mr. Stewart was selected to succeed him. He was also one of the managing directors of the firm of Carnegie, Phipps & Company, and President of the Carnegie Natural Gas Company.

During the period between 1860 and 1885, he served as director in the Allegheny Valley Railroad Company, and in the Pittsburgh, Virginia and Charleston Railroad Company.

Mr. Stewart was a man of genial manner and remarkable courtesy, which qualities gained him the esteem of all with whom he was brought in contact, either socially or in business relations. Conservative by nature, he was a restraining force in the companies with which he was connected, and in all their changes he gained the confidence of his associates, although they might differ in questions of policy as to the regulation of business.

Mr. Stewart became a Fellow of the American Society of Civil Engineers November 7th, 1872.

DENNIS H. MAHAN, Hon. M. Am. Soc. C. E.

DIED SEPTEMBER 16TH, 1871.

Dennis Hart Mahan was born April 2d, 1802, in the city of New York. His early education was such as could be obtained in the schools of Norfolk, Va., to which city his parents removed a short time after his birth.

He was destined for the profession of medicine, but having a strong taste for drawing, and hearing that this was taught with special care at the Military Academy at West Point, he sought and obtained an appointment through the influence of a friend of his family, then a member of the House of Representatives.

After the usual course of study, he was graduated in 1824. His career while a cadet was an exceptional one, and he had the honor of being appointed an acting Assistant Professor of Mathematics when only a third classman. Immediately after his graduation, he was appointed Second Lieutenant in the Corps of Engineers, but remained at the Academy as an instructor. In 1825 he was made Assistant Professor of Engineering, and in 1826 was sent by the War Department to study in Europe, where he remained four years. While there he became a special student at the Military School of Application for Engineers and Artillerists at Metz through the special favor of the Ministry of War of France.

He returned home in 1830 and resumed his position as instructor at West Point. In 1832 he was appointed Professor of Military Engineering, which post he filled until his death, September 16th, 1871, a period of over 41 years.

Professor Mahan received the degree of LL.D. from William and Mary College, and also from Dartmouth College and Brown University.

He was a member of many scientific associations, both in America and in Europe, and was one of the original corporators of the National Academy of Sciences.

He was the author of many works on engineering and kindred subjects, some of which passed through several editions and are recognized as standard authority. His first work, "Treatise on Field Fortification," appeared in 1836, and is still considered, by those competent to judge, as the best work on the subject in the English language. His "Elementary Course of Civil Engineering" was first issued in 1837; it was reprinted from time to time until 1868, when it was rewritten. Many editions of this work were printed, and it was translated into several foreign languages. Besides, there were published a treatise on "Advance Guard, Outpost and Detachment Service of Troops" (1847, improved edition, 1862); "Treatise on Industrial Drawing" (1885) and "Treatise on Fortification Drawing and Stereotomy" (1865).

He also edited, with additions, an American reprint of Moseley's "Mechanical Principles of Engineering and Architecture" (1856).

Professor Mahan's life was almost entirely devoted to teaching, and the influence he exerted through it was wide and extended, especially upon engineering science. For many years the Military Academy at West Point was the only school of mathematical and physical science, where the rigid requirements and high standard now esteemed essential were even attempted, and hundreds of officers have been graduated from that institution who have gained a brilliant reputation and honored success in civil and military duties who acquired under Professor Mahan the rudiments of their profession and the fundamental truth, that without precision of ideas, rigid analysis and hard work, there can be no such thing as success.

In military science Professor Mahan gave the best efforts of his life, and into its teaching he threw all the indomitable energy which was so eminently characteristic of him. His labors bore abundant results, both in the war with Mexico and in the more extended area of the late civil war.

In his domestic relations Professor Mahan was one of the kindest and most affectionate of men, and his attention to the little amenities of life, so often considered of little importance, marked him preeminently as a gentleman.

In his connection with the Academy he ever showed the greatest fidelity to its interests, and always made his personal aims and ambition subservient. Its roll bears no more honored name than his, and his memory cannot fail to stimulate in others the growth of those sterling virtues which he so highly prized and so worthily illustrated.

Professor Mahan became an Honorary Member of the American Society of Civil Engineers, March 2d, 1853.

NOTE.—Abstract from Memoir read before the National Academy of Sciences.

HOMER STANLEY GOODWIN, M. Am. Soc. C. E.*

DIED OCTOBER 25TH, 1892.

Homer Stanley Goodwin was born at South Farms, now Morris, Litchfield County, Conn., on the 28th day of September, 1832. His parents were Kasson and Maria (De Wolfe) Goodwin. At his New England home he received his only education at the common schools. On the 25th of July, 1865, he married Elizabeth Faher Buehler, of Harrisburg, Pa., whose first husband, surnamed Hammond, was a brother of Surgeon-General Hammond, of Washington, D. C. His widow, three unmarried children, Henrietta Rue, Helen and Leonard, and a stepson, William B. Hammond, survive him.

As a civil engineer, Mr. Goodwin's record is one of rapid advancement, betokening personal worth, both of character and of acquirement, and the appreciation of it. In the narration of this we quote from Mr. Goodwin's brief response in 1881 to a circular issued by the American Society of Civil Engineers, requesting a statement of the professional life of its members: "First engaged as rodman on the location of what is now the Southern Division of the Delaware, Lackawanna and Western Railroad, in November, 1851. Appointed Assistant Engineer of the same when construction commenced in the summer of 1852. Had charge of the construction of the division from Pocono Summit to Paradise for one year, then of the division of the Warren Railroad (leased by the Delaware, Lackawanna and Western Company) from the Delaware River Bridge to the Oxford Tunnel, both inclusive. On their completion in March, 1857, engaged with Mr. John C. Trautwine as Principal Assistant Engineer in the survey of the Honduras Interoceanic Railway. Upon the completion of this survey, maps, estimates, etc. (April, 1858), engaged with the Pittsburgh, Fort Wayne and Chicago Railroad, as Resident Engineer of the Western Division, in charge of maintenance of way and construction. Left that road in August, 1860, to accept the appointment of Superintendent of the Catawissa Railroad (now under lease to the Philadelphia and Reading Railroad Company). Left that road in 1863 (April 1st), to accept the appointment of Chief Engineer of the Northern Central Railway." This position he held until April 1st, 1866, when he became Assistant General Superintendent of the Lehigh Valley Railroad, and on December 1st, 1882, he succeeded Mr. Robert H. Sayre as General Superintendent. When the consolidation of the Lehigh Valley lines in Pennsylvania and New York was effected, Mr. Goodwin was entitled, on December 1st, 1888, General Eastern Superintendent, and when the Lehigh Valley Railroad became a part of the Philadelphia and Reading Railroad system, he was the General Superintendent of the Eastern Division.

* Memoir prepared by Thos. S. McNair, M. Am. Soc. C. E.

Mr. Goodwin became a member of the American Society of Civil Engineers on the 20th of July, 1870. He was appointed in January, 1886, chairman of the Committee to Consider the Inter-Relation of Sections of Railway Wheels, and Rails, and in January, 1890, on the Committee on Standard Rail Sections.

At a meeting of the Society held January 4th, 1893, Mr. Robert L. Harris said: "Thirty-six years ago in April, a party of 65, mostly hearty, rugged young men, from various parts of the United States, sailed out of the port of New York on the small schooner *Favorita*, to make a railway survey from ocean to ocean across Honduras, then a *terra incognita*. At the expiration of a year, 18 of the 65 came back together, weakened in health and constitutions, but rejoiced that the surveys had been accomplished through their persistent efforts.

"Our late member, Mr. H. Stanley Goodwin, C. E., was one of the three division engineers; he was a trusty comrade of good heart and big soul; he showed his pluck and perseverance in that he was one of the 18. He showed pluck in going, for it was just after the Panama Railway was built, where each tie was said to represent a human life; and he showed fortitude and perseverance in that he was one of those to remain for better or worse, through sickness and the shadow of death, and to return as one of the 18 whose hearts had been knitted through mutual kindly care in disease and trouble.

"As is the misfortune of our profession, we met and we parted. Since 1858, our paths have been diverse and I have seen little of him, but have always remembered him with the kindest of feelings, and I could not let the announcement of his death pass without saying these words and shedding these tears in memory of a dear and faithful comrade."

Mr. Goodwin had been Demonstrator in Civil Engineering at Lehigh University during Dr. Henry Coppee's administration, 1865–67. He was president of the American Society of Railroad Superintendents, a member of the Executive Committee of the American Railway Association, and a member of the American Institute of Mining Engineers.

Mr. Goodwin's career, consistent in the pursuit of one branch of engineering, impresses us with a sense of its completeness. He was a railroad engineer, finding in operation the supplement of construction. He was persistently industrious, never content with mere supervision, and to his great energy he brought an extraordinary capacity for labor. He was gifted with a rare ability of securing means to ends. During Mr. Goodwin's long connection with the Lehigh Valley Railroad Company, that road developed from a coal carrier distinctively to an independent trunk line, and correspondingly the call for his industry increased. While his administration of railroad affairs was strictly economical and conservative, yet he deemed betterments as essential as maintenance. He was known to his colleagues as a careful and judicious manager, and to employees as one whom they might approach with confidence. The following tribute was included in the president's report to the stockholders of the Lehigh Valley Railroad at the last annual meeting: "It is with sorrow that we record the loss to

this company of one of its most valued officers. Suddenly, in the early morning of last Christmas Day, H. Stanley Goodwin, our General Eastern Superintendent, departed this life. For 26 years he faithfully served this company; how faithfully and loyally those of us know who have been longest associated with him. He was active in whatever advanced the welfare of the various institutions with which he was connected, and of the community in which he lived. He was conscientious and zealous in the performance of all duties resting upon him. He was an upright man and a good citizen."

As a townsman, Mr. Goodwin possessed in an eminent degree, a "public conscience." For 18 years he was annually elected burgess of the borough of South Bethlehem, and not only took a live interest, but participated energetically, in municipal affairs. While filling this office in the years 1881 and 1882, he won the lasting regard of his fellow citizens for his humanitarian services during a smallpox epidemic. He systematized relief measures, and with a few co-workers quarantined the town and established a hospital. Unconcerned for himself and separating himself from family and friends, he encouraged the dispirited and ministered to the suffering. After 300 victims had fallen, the progress of the dread disease was stayed. As a memorial of the gratitude of a stricken people to a self-sacrificing man, a silver service is cherished by the Goodwin family.

He filled many positions of honor and responsibility in the town of his residence, being a trustee of Lehigh University, of St. Luke's Hospital, and of Bishopthorpe School. He was a vestryman of the Church of the Nativity of South Bethlehem, and was a delegate or alternate to every convention of the Diocese of Central Pennsylvania, since the formation of that diocese in 1870.

He became associated with the masonic fraternity in 1854, soon after reaching his majority. He was a devoted member and was elected to the highest offices.

Mr. Goodwin attended the dinner of the New England Society, at Philadelphia, on the 23d of December, 1892, and greatly enjoyed the occasion. The following day he spent at his office at South Bethlehem and worked there until 9 o'clock that night. At the dawn of Christmas Day, taken suddenly with heart disease, death claimed him. A noble man, a gifted leader, a beloved member—we mourn his loss.

LIST OF MEMBERS.

ADDITIONS.

MEMBER.	Date of Membership.
FOLLETT, WILLIAM W.....41 Jacobson Block, Denver, Colo.....	July 5, 1893.

ASSOCIATE MEMBER.

HOOD, RICHARD HADEN.....205 S. Broad St., Trenton, N. J. May 3, 1893.

JUNIORS.

BAIRD, HOWARD CARTER.....Phœnix Bridge Co., Phœnixville, Pa..... June 6, 1893.

COLEMAN, FREDERICK ALBERT..56 Lincoln Ave., Cleveland, O..... April 4, 1893.

CHANGES AND CORRECTIONS.

HONORARY MEMBER.

WILSON, W. HASELL.....President Belvidere Delaware R. R., 233 South Fourth St., Philadelphia, Pa.

MEMBERS.

AIKEN, WILLIAM A.....4761 Madison Ave., Chicago, Ill.
ALVORD, JOHN W.....Engineer Surveys and Grades, World's Columbian Exposition, Jackson Park, Ill.
CLARK, JACOB M.....145 Madison Ave., Elizabeth, N. J.
CLARKE, THOMAS C.....44 Broadway, New York City.
DAVIS, FRANK P.....46 I St., Washington, D. C.
DAVIS, JOSEPH P.....Chief Engineer Am. Bell Telephone Co., 113 West Thirty-eighth St., New York City.
DONOVAN, JOHN J.....General Superintendent B. B. & Eastern R. R., Fairhaven, Wash.
FOOTE, A. D .....P. O. Box 186, San Diego, Cal.
HOLBROOK, F. W. D.....Puget Sound Naval Station, Port Orchard, Wash.
JENNINGS, W. H.....205 N. Washington Ave., Columbus, O.
KIELLAND, S. MUNCH.....Montana Midland R. R., Box 405, Helena, Mont.
KILLEBREW, SAMUEL.....Brownsville, Tenn.
MCKEE, CHARLES H.....Whitehall, N. Y.
MILLS, CHARLES M.....Walters Park P. O., Berks Co., Pa.
MORSE, B. F..... .....36 Cheshire St., Cleveland, O.
NEARING, FRANK.....(Brendlinger & Nearing), Yonkers, N. Y.
PATTEN, HENRY B.....208 West Twenty-second St., Cheyenne, Wyo.
PICKETT, WILLIAM D.....Mee-tee-tse, Wyo.
PIKE, WILLIAM A.....2525 University Ave., S. E., Minneapolis, Minn.
RANDOLPH, L. S..... .....Professor of Mechanical Engineering, Virginia Agricultural and Mechanical College, Blacksburg, Va.
STRIEDINGER, JULIUS H.....819 Market St., Room 56, San Francisco, Cal.
THOMSON, GEORGE H.....Wagner Palace Car Co., Grand Central Station, New York City.

TOMLINSON, A. T.....P. O. Box 5, Huntington, N. Y.
VAN AUKEN, A. M.....717 Omaha Bldg., Chicago, Ill.
VOORHEES, THEODORE.....1025 Spruce St., Philadelphia, Pa.
WATKINS, RICHARD .....“Eunonyhareenyha,” Toscheth Road, Glebe-point, N. W., Australia.
WAY, ROBERT A.....(Care Messrs. King, King & Co.), Bombay, India.
WEGMANN, EDWARD, Jr.....Division Engineer New Croton Aqueduct, Katonah, N. Y.

ASSOCIATE MEMBERS.

ANGIER, W. E.....Office of Chief Engineer I. C. R. R., Twelfth St., Chicago, Ill.
CUMMINGS, R. A.....1230 N. Calvert St., Baltimore, Md.
EASBY M. WARD.....Media, Pa.

JUNIORS.

BLOSS, WILL H.....Corvallis, Ore.
COXE, E. H.....447 E. Broad St., Columbus, O.
FENN, WILLIAM H.....58 Washington St., Middletown, Conn.
HAWKS, A. McL.....612 Fidelity Bldg., Tacoma, Wash.
HOPPER, JOHN J.....215 West 125th St., New York City.
HORTON, SANDFORD .....164 East 28th St., New York City.
KINSEY, FRANK W.....10 South St., Newark, N. J.
KNOWLES, MORRIS.....Engineer Dept., Metropolitan Water Supply, Boston, Mass.
POTTER, W. S.....2008 Second Ave., South, Minneapolis, Minn.
SHALER, IRA A.....2 Wall St., New York City.
SHERMAN, CHARLES M.....Cornell University, Ithaca, N. Y.
STANFORD, H. R.....Alton, Ill.

DEATHS.

CLEMENS, ERNEST VICTOR.....Elected Member March 1st, 1893; died Sept. 3, 1893.
JOHNSON, CHARLES ROBERTS....Elected Member June 3, 1893; died Sept. 11, 1893.

ADDITIONS TO
LIBRARY AND MUSEUM.

From American Institute of Mining Engineers:
- An Improved Hanging Compass.
- Blowing Engines.
- General and Special Observations Concerning Ore Dredging.
- Geological Distribution of the Useful Metals in the United States.
- Improved Slag Pots.
- Microscopic Metallograph.
- Mining and Mineral Statistics.
- Note on Experiments on the Specific Gravity of Gold contained in Gold-Silver Alloys.
- On a Remarkable Deposit of Wolfram Ore in the United States.

Proceedings of the Sixty-fifth Meeting.
Segregation and its Consequences in Ingots of Steel and Iron.
Summary of American Improvements and Inventions in Ore Crushing and Concentration.
Tests of Hydraulic Materials.
The Bertha Zinc Mines.
The Bessemer Process as Conducted in Sweden.
The Consumption of Fuel in the Taylor Gas-Producer Plants at the Aspen and Marsac Mills Compared.
The Detection and Measurement of Fire-Damp in Mines.
The Hydrogen-Oil Safety Lamp.
The Limitations of the Gold Stamp Mill.
The Lead and Zinc Deposits of the Mississippi Valley.
The Mineral Deposits of Southwestern Wisconsin.
The Open-Hearth Process.
The Origin of the Gold-Bearing Quartz.

From Central University of Ecuador:
Anales. Serie 8, Nos. 58, 59, 60.

From Committee of Locomotive and Carriage Superintendents, India:
Proceedings, Vol. III, 1891.

From Robert C. Gemmell, Pendleton, Ore.:
Diagram for Hydraulic Formulas.

From Institution of Civil Engineers, London, Eng.:
Chinipas Aqueduct and Mineral Railway.
Designing Wheel Teeth.
Flow Off a Catchment Area near Mercara, South India.
Foundations in "Black Cotton Soil" in India.
Mining and Ore Treatment at Broken Hill, N. S. W.
Minutes of Proceedings, Vol. CXIII.
The Chenab Weir.
The Irawadi Delta.
Steam-Engine Trials.
Wreck Raising in the Thames.

From Iron and Steel Institute, London, Eng.:
Journal No. 1, 1893.
Rules and List of Members.

From Liverpool Engineering Society:
Transactions, Vol. XIV.
List of Members.

From Niles Merriwether, Memphis, Tenn.:
Statements and Estimates relating to Pavements, Sewers, etc., in Memphis, Tenn.

From North of England Institute of Mining and Mechanical Engineers:
Transactions, Vol. XLII, Part IV.
List of Officers and Members, 1893-94.

From Patent Office, London, Eng.:
Abridgments of Specifications of Patents.

From R. P. Rothwell, N. Y.:
Universal Bimetallism.

From Royal Society of Canada:
Proceedings and Transactions, Vol. X, 1892.

From Sanitary District of Chicago:
Proceedings, August 23d to September 11th.

From South African Association of Engineers and Architects:
Proceedings, 1892-93.

From U. S. Geological Survey:
Forty-four maps of the U. S. Survey.

From U. S. Navy Department, Chief of Ordnance:
Study of the Action of Powder in a 10-Centimeter Cannon. (Ordnance Notes, No. 62.)

From U. S. Patent Office:
Alphabetical List of Patentees and Inventors for the quarter ending March 31st, 1893.

From University of the State of New York:
Statistics of New York Libraries. Bulletin No. 1, August, 1893.

From H. M. Wilson, Washington, D. C.:
Six maps of the U. S. Geological Survey.

From C. J. Woodbury, Boston, Mass.:
Electrical Transmission of Power for Cotton Mills.
Recent Developments in the Electrical Transmission of Power.

ERRATA.

Proceedings (July, 1893), Vol. XIX, page 134, 6th line, for the word *desirable* read *necessary*.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XIX.—October, 1893.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to Members.)

OF THE SOCIETY.

OCTOBER 4TH, 1893.—The Society met at 20 o'clock, Vice-President Brush in the chair, F. Collingwood, Secretary. Ballots were canvassed, and the following candidates were declared elected: As Members: Abraham Fairbanks Doremus, Salt Lake City, Utah; Albert Bailey Drake, New Bedford, Mass.; John Herron, Marysville, Mont.; William Howland Leffingwell, Busk, Colo.; Thomas Pettigrew, Parkersburg, W. Va.; Dwight Porter, Boston, Mass.; George Austin Quinlan, Houston, Tex.; Richard Schermerhorn, Brooklyn, N. Y.; Job Tuthill (elected Junior June 6th, 1888), Grand Rapids, Mich.; Edwin Hall Warner (elected Associate Member May 6th, 1892), Seattle, Wash.; George Smedley Webster (elected Associate Member September 7th, 1892), Philadelphia, Pa.; William Wheeler, Boston, Mass.; Pope Yeatman, Joplin, Mo. As Associate Members: Charles Edward Corby, Brooklyn, N. Y.; James Simpson Browne, Providence, R. I.; Anson Marston, Ames, Ia.; Henry Earle Riggs, Toledo, O.; Louis Carlton Sabin, Sault Ste. Marie, Mich.; John Frederic Temple (elected Junior November 5th, 1890), Kansas City, Mo.; George Hill, New York City.

The election by the Board of Direction of seven candidates as Juniors, and one Fellow, was announced.

A paper on "Storage and Pondage of Water," by J. P. Frizell, M. Am. Soc. C. E., was read by the Secretary, and discussed by Messrs. Brush, H. W. Brinckerhoff, Crowell, Fteley, Owen and Worthen.

OCTOBER 18TH, 1893.—The Society met at 20 o'clock, Vice-President Brush in the chair; F. Collingwood, Secretary. The death of D.

Lowber Smith, M. Am. Soc. C. E., on October 10th, 1893, was announced.

A paper on "Railroad Location," by Michael L. Lynch, M. Am. Soc. C. E., was presented in abstract by the Secretary, and written discussions were read from Messrs. James R. Maxwell, J. E. Greiner, Charles H. Snow, W. B. Storey, Jr., J. Q. Barlow, H. G. Kelley, C. D. Purdon, Henry Gannett, R. G. Tarr, E. H. Beckler and D. H. Ainsworth. The paper was discussed orally by P. F. Brendlinger, M. Am. Soc. C. E., and W. Shellshear, M. I. C. E.

Of the Board of Direction.

October 3d, 1893.—Applications were considered and other routine business transacted.

The following candidates were elected: As Fellow: Alfred Watts Kiddle, New York City. As Juniors: William Sayre Allen, Wetumpka, Ala.; George Hallett Clarke, New York City; Ira Grant Hedrick, Kansas City, Mo.; Henry Neeley Ogden, Willow Springs, Ill.; Enos L. Shaw, Marinette, Wis.; Augustus Thompson Throop, Niagara Falls, N. Y.; Silas Baker Tuttle, Brooklyn, N. Y.

The following report from the Nominating Committee was received:

New York, September 23d, 1893.

To the Board of Direction of the American Society of Civil Engineers:

Gentlemen,—The undersigned of the Nominating Committee present the following nominations:

For President.—William P. Craighill.

For Vice-Presidents.—F. Collingwood and Joseph M. Wilson.

For Secretary.—Charles Warren Hunt.

For Treasurer.—John Bogart.

For Directors.—Charles B. Brush, Bernard R. Green, Joseph M. Knap, T. Guilford Smith, Robert B. Stanton, Henry D. Whitcomb.

(Signed)	William E. Worthen.	(Signed)	Clark Fisher.
	Thomas C. Keefer.		Fred. Brooks.
	M. J. Becker.		Adolphus Bonzano.
	O. Chanute.		Charles L. Strobel.
	Mendes Cohen.		J. B. Johnson.
	G. S. Greene, Jr.		John MacLeod.

A letter was received from Mr. Charles B. Brush declining the nomination for Director, and requesting that another name be substituted in accordance with Art. VII, Sec. 1, of the Constitution.

The name of William H. Burr was substituted, and the nominations, so amended, ordered sent to each corporate member of the Society (Art. VII, Sec. 1).

MEMOIRS OF DECEASED MEMBERS.

ALLEN B. HEGEMAN, M. Am. Soc. C. E.*

DIED OCTOBER 22D, 1892.

Mr. Hegeman was born at Rochester, N. Y., October 31st, 1861. His education was purely mathematical, and was completed at the Rhinebeck, N. Y., Institute. After completing his studies his training as a practical engineer began under the direction of his brother, W. W. Hegeman, M. Am. Soc. C. E., and comprised railroad location and construction and various other preliminary work, until 1881, when he engaged with the New York, Chicago and St. Louis Railroad, becoming Resident Engineer, with headquarters at Erie, Pa. This position he resigned in 1881, to accept a similar appointment on the Mexican National Railway. He remained in the service of this corporation until the final suspension of all work under the Parnell Sullivan concessions, when he returned to the United States and accepted an engagement on the Ohio River Railway as Division Engineer. On the completion of this line he located an east and west line across the Peninsula of Florida in the interest of New York parties; afterwards as Contracting Engineer he supervised the construction of the Kansas City Line of the Chicago, Milwaukee and St. Paul Railway at Iowa and Missouri.

In December, 1887, failing health caused him to give up active work and seek the mountains of Mexico. Recovering his health, early in the year 1888 he became identified with the Mexican Central Railway as Locating Engineer, being afterwards made Division Engineer of the construction of its subsidiary lines to the mining region. The Inter-Oceanic Railway then came into prominence, and he was engaged upon it between Vera Cruz and Pueblo up to the time of his death, which occurred October 22d, 1892, and was caused by a virulent attack of typhoid fever. Mr. Hegeman's professional work combined both quickness and accuracy, and he possessed strong executive qualities as well. Personally he was of a retiring disposition; strong in impulse, he was equally strong in loyalty to those whom he admitted to close friendship. He became a member of the American Society of Civil Engineers February 1st, 1888.

* Memoir prepared by W. W. Hegeman, M. Am. Soc. C. E.

AUGUSTUS WOODBURY LOCKE, M. Am. Soc. C. E.*

DIED MAY 14TH, 1893.

Augustus Woodbury Locke was the eldest son of Gardner T. Locke and Julia (Garland) Locke, of Rye, N. H., and was born in that town February 26th, 1846. He died at North Adams, Mass., which had been his home for about 20 years.

He was educated at the Hampton and Pittsfield Academies in his native State and at the Massachusetts Institute of Technology in Boston. He was of the eighth generation in America, being a lineal descendant of Captain John Locke, who is described as a man of prominent position among the early settlers of New Hampshire, and as displaying great energy and wonderful courage in defeating the Indians in several of their descents upon the town of Rye. He was finally killed by Indians while reaping in his field in 1696.

Mr. Locke's mother's family were also early settled in New England, they being descended from Peter Garland, who came from London and lived in Boston in 1637. The hardships incident to colonization necessarily developed a hardy race. They fought in the early French and Indian wars, and in the later struggle, the Revolution, were represented by three of the great-grandfathers of the subject of this memoir. From this line of Puritan ancestry Mr. Locke inherited a high sense of honor and an unflinching courage in his adherence to those principles which his conscience dictated. He was always greatly impressed with the grandeur of the struggle of these early people of New England in their endeavor to perpetuate their ideas in the New World. He was greatly interested in their history, and, when in Europe, visited the localities whence the early English and Dutch colonists came.

In 1862, at the age of sixteen, he entered the United States Navy, and served a year and a half as seaman. After his discharge he studied civil engineering, served in the United States Coast Survey and elsewhere, and in 1869 became Assistant Engineer, under Benjamin D. Frost, M. Am. Soc. C. E., on the Hoosac Tunnel, then in process of construction by the State of Massachusetts. He had charge of the eastern division until the headings met. The marvelous accuracy with which the engineering features of this enterprise were conducted constituted a triumph in underground work which it is safe to say has never been exceeded in any similar instance. Mr. Locke's service in producing these results, together with that of the other two principal assistants, was warmly commended by their chief and by the

* Memoir prepared by F. B. Locke, Esq.

State authorities. In the execution of the later work upon the tunnel —the lining of a considerable portion of its length with masonry, the building of the façade at the eastern portal, etc.—he served as principal assistant. He afterwards served as engineer of maintenance of way of the Troy and Greenfield Railroad and Hoosac Tunnel, and during the time of this service designed the ventilating galleries at the central shaft of the tunnel, and executed other important works along the line of the road. He was eventually appointed General Manager and Chief Engineer of the railroad and tunnel, which were owned and operated as one property by the Commonwealth. This position he held about seven years, until the property was sold to the Fitchburg Railroad Company, in 1887. His retirement from the management was made memorable by the presentation to him of a handsome testimonial by the officers and employees of the railroad, and by the generous commendation of his past services received from the Governor of the State.

In 1888 he was appointed, under an act of the Massachusetts Legislature, a member of a board of commissioners to investigate the subject of the gradual abolition of the crossings of highways by railroads at grade, and upon the organization of this board he was made its chairman. He was one of the earliest to urge the necessity of preventing the increase and of gradually eradicating the evil of grade crossings. The reports to the Legislature and to various cities where he assisted as commissioner, together with papers of which he was the author, constitute a considerable portion of the literature touching upon this subject, and the awakening to the magnitude of its importance is due in no small degree to the work performed by him. He was appointed to serve as commissioner or as engineer in many instances in connection with this subject. A partial list of reports, etc., follows:

Report to the Massachusetts Legislature, 1889, upon the Gradual Abolition of the Crossings of Highways by Railroads at Grade. By Augustus W. Locke, William O. Webber and George A. Kimball.

Report on Armory Street, Springfield, Mass.

Report to the City Government on the Abolition of Grade Crossings in the City of Worcester. By Charles A. Allen, A. W. Locke and J. W. Ellis.

Reports to the City Government on the Abolition of Grade Crossings in the City of Northampton. City *vs.* The Boston and Maine and The New York, New Haven and Hartford Railroads.

Report on the Abolition of the Grade Crossings in Buffalo. By E. L. Corthell and Augustus W. Locke.

Report on the Abolition of the Grade Crossings on the Line of the Boston and Maine Railroad in the City of Lynn. By Augustus W. Locke and Franklin B. Locke.

Other cases where he made reports or investigations include Natick, West Springfield, Westfield, Chartlon, Marshfield, Braintree, North Wilbraham, Boston, Wilbraham, Monson, Williamstown and Belchertown, in nearly all of which cases he was appointed by the Superior Court, as provided by legislative act of 1890. In 1892 he studied the European practice as regards this subject, together with the kindred subjects of elevated and depressed terminals and stations. A result of this trip to Europe was a paper read before the Boston Society of Civil Engineers, of which he was a member. He worked for the movement favoring improved roads, designed various works in the way of water supply and power and drainage. His counsels were sought by his neighbors and fellow-townsmen, by whom he was greatly beloved and for whose friendship he had the highest regard. In 1876 he married Miss Martha P. Perkins, of Hampton, N. H., by whom, together with one son and three daughters, he is survived. After 1890 to the time of his death, he was in the private practice of his profession.

Mr. Locke became a member of the American Society of Civil Engineers on June 7th, 1882.

WILLIAM WILLIAMS WALKER.

DIED SEPTEMBER 23D, 1893.

William Williams Walker, son of William Ames and Sarah W. (Ingalls) Walker, was born in Middlefield, Otsego County, N. Y., August 8th, 1834. His education was gained chiefly at Cortland Academy, Homer, N. Y., Cherry Valley, N. Y., and Brown University, Providence, R. I.

In 1853 he became a student at the Rensselaer Polytechnic Institute, Troy, N. Y., from which he was graduated in 1856.

His first practical experience in engineering was as rodman in a construction party. After a few years of work in a subordinate capacity, in 1860 he was appointed Chief Engineer of the Cedar Rapids and Missouri River Railroad, which position he retained until 1870, building between these years 272 miles of the road. From 1867 to 1872 he was also Chief Engineer and General Superintendent of the Sioux City and Pacific Railroad, and built 100 miles of the road.

From 1869 to 1872 he was Chief Engineer of the Iowa Falls and Sioux City Railroad, as well as of the Fremont, Elkhorn and Missouri Valley Railroad.

In 1873 he became Chief Engineer and General Superintendent of the Burlington, Cedar Rapids and Minnesota Railroad, and in 1879 was appointed Vice-President and General Superintendent of the St.

Louis, Hannibal and Keokuk Railroad. He was also extensively engaged in other railroad enterprises in Missouri and the far Southwest.

Besides his connection with these various railroad companies Mr. Walker was also at different times President of the First National Bank of Cedar Rapids, of the Cedar Rapids Water Company, and of the United States Central Railroad. He was at one time editor of the Cedar Rapids *Times*, and, later, President of the Republican Printing Company, and for a time its editor. He was also for a time President of the State Press Association of Iowa.

The greater portion of Mr. Walker's life was passed in the City of Cedar Rapids, Ia., in whose interest he always took an active part. Everything which could possibly be considered as a factor in the social or political life of the city was always regarded by him with earnest attention and deep solicitude; and in the development of his adopted State, Mr. Walker, through his wide experience as an engineer and railroad builder, took no unimportant part.

He was a member of the First Presbyterian Church of Cedar Rapids, and was an elder in this church for many years.

In the private relations of life he was a man "without fear or reproach," and gained the esteem and confidence of all who became acquainted with him. Lovable by nature, he attracted to him many outside his own family circle, who learned to love him sincerely and respect him greatly. He leaves a widow and three married daughters.

Mr. Walker was elected a Member of the American Society of Civil Engineers October 6th, 1880.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.		Date of Membership.
DOREMUS, ABRAHAM FAIRBANKS	City Engineer, Salt Lake City, Utah	Oct. 4, 1893
DRAKE, ALBERT BAILEY	164 William St., New Bedford, Mass.	Oct. 4, 1893
HERRON, JOHN	Montana Mining Co., Limited, Marysville, Mont.	Oct. 4, 1893
LEFFINGWELL, WILLIAM HOWLAND	Resident Engineer, Busk Tunnel Ry., Busk, Colo.	Oct. 4, 1893
PORTER, DWIGHT	Mass. Institute Technology, Boston, Mass.	Oct. 4, 1893

QUINLAN, GEORGE AUSTIN	Houston, Tex	Oct. 4, 1893
SCHERMERHORN, RICHARD	168 Montague St., Brooklyn, N. Y.	Oct. 4, 1893
TUTHILL, JOB	Engineer Bridges and Buildings C. & W. M. Ry., Grand Rapids, Mich.	J. June 6, 1888 M. Oct. 4, 1893
WEBSTER, GEORGE SMEDLEY	Chief Engineer, Bureau of Surveys, City Hall, Philadelphia, Pa.	Assoc. M. Sept. 7, 1892. M. Oct. 4, 1893
WHEELER, WILLIAM	89 State St., Boston, Mass.	Oct. 4, 1893

ASSOCIATE MEMBERS.

BROWNE, JAMES SIMPSON	224 Butler's Exchange, Providence, R. I.	Oct. 4, 1893
CORBY, CHARLES EDWARD	236 Arlington Avenue, Brooklyn, N. Y.	Oct. 4, 1893
HILL, GEORGE	44 Broadway, New York City	Oct. 4, 1893
LOOKER, HENRY BRIGHAM	918 F St., Washington, D. C.	May 3, 1893
MARSTON, ANSON	Iowa Agricultural College, Ames, Ia.	Oct. 4, 1893
RIGGS, HENRY EARLE	7 Cheney Flats, Toledo, O.	Oct. 4, 1893
SABIN, LOUIS CARLTON	U. S. Engineer's Office, Sault Ste. Marie, Mich.	Oct. 4, 1893

JUNIORS.

CLARK, GEORGE HALLETT	59 East 67th St., New York City	Oct. 3, 1893
MCKENZIE, THOMAS	Plymouth Rock House, Plymouth, Mass.	May 2, 1893
THROOP, AUGUSTUS THOMPSON	226 Fifth St., Niagara Falls, N. Y.	Oct. 3, 1893
TUTTLE, SILAS BAKER	969 Greene Ave., Brooklyn, N. Y.	Oct. 3, 1893

CHANGES AND CORRECTIONS.

MEMBERS.

ABBET S. THAYER	Metropolitan Club, Washington, D. C.
ASPINWALL, THOMAS	3 Hamilton Place, Boston, Mass.
BARLOW, J. Q.	Chief Engineer, Burrard Inlet and Fraser Valley Ry., Tacoma, Wash.
BARTLETT, WINTHROP	Chief Engineer, St. Louis and Suburban Ry., 304 North Eighth St., St. Louis, Mo.

BASSETT, GEORGE B .....363 Washington St., Buffalo, N. Y.
BEAHAN, WILLARD .....202 Pleasant St., Streator, Ill.
BERG, LOUIS DE COPPET.....31 East 17th St., New York City.
BILLIN, CHARLES E..... .....(Care Fraser and Chalmers), Fulton and Union Sts., Chicago, Ill.
BISSELL, FRANK E.....Fort Worth, Texas.
BLACKFORD, FRANCIS W., Jr.....City Engineer, Butte, Mont.
BOOKER, B. F.....Resident Engineer, A. T. & S. F. R. R., Ft. Madison, Ia.
BREITHAUPT, WILLIAM H.....10 West 29th St., New York City.
BROWN, THOMAS E., Jr.....114 Nassau St., New York City.
BURBANK, GEORGE B.....Chief Engineer, Cataract Construction Co., Niagara Falls, N. Y.
BURNET, GEORGE.....Rialto Bldg., St. Louis, Mo.
BUTLER, M. J.....Chief Engineer, Bay of Quinta Ry. and Navigation Co., Napanee, Ont., Canada.
CARTWRIGHT, ROBERT.....6 Bates St., Rochester, N. Y.
CODWISE, E. B.....City Engineer, Kingston, N. Y.
COWLES, W. L.....274 Belden Ave., Chicago, Ill.
DAVIS, CHARLES .....277 Western Ave., Allegheny City, Pa.
DENNIS, W. F.....Hanewinckel Bldg., Richmond, Va.
DOUGLAS, H. T.....920 Equitable Bldg., Baltimore, Md.
EATON, FRED.... .....Burdick Block, Los Angeles, Cal.
FAIRLEIGH, JAMES A.....Brandenburg, Ky.
FANNING, JOHN T.....330 Hennepin Ave., Minneapolis, Minn.
FAVA, FRANCIS R., Jr..... ....Atlantic Bldg., Washington, D. C.
FERGUSON, JOHN W.....152 Market St., Paterson, N. J.
FLAGG, J. FOSTER .....177 Sixth Ave., Brooklyn, N. Y.
FOUQUET, JOHN D.....35 Broadway, Room 108, New York City.
GATCHELL, GEORGE S.....Commissioner of Public Works, Buffalo, N. Y.
GRANT, E. W.....Union Depot, Room 1, Pueblo, Colo.
HAINES, CASPAR WISTAR.....906 Filbert St., Philadelphia, Pa.
HAZLEHURST, GEORGE B .....1215 N. Charles St., Baltimore, Md.
HILL, WILLIAM R.....Chief Engineer, Water Works, Syracuse, N. Y.
HINCKLEY, HOWARD V.....Box 242, Topeka, Kans.
HOBSON, JOSEPH.....Chief Engineer, Grand Trunk Ry., Hamilton, Ont., Canada.
HOFF, OLAF.... .....228 Lumber Exchange, Minneapolis, Minn.
JACKSON, J. M.....Romeoville, Ill.
JOHNSTON, A. LANGSTAFF .....4300 Lancaster Ave., Philadelphia, Pa.
KEITH, GEORGE T.....Chief Engineer, Water and Power Co., 62 Imperial Bldg., Montreal, Canada.
KELLEY, WILLIAM D..... . .....1016 Vermont Ave., Washington, D. C.
KENDRICK, JOHN W.....Chief Engineer N. P. R. R., St. Paul, Minn.
KENLY, W. W.....289 Fourth Ave., New York City.
KINNEY, EDWARD C.....145 S. Lincoln Ave., Denver, Colo.
LOREE, L. F.....155 St. Clair St., Cleveland, O.

LOWRIE, HARVEY C.....207 California Bldg., Denver, Colo.
LUTZ, U. S.....1248 North Twelfth St., Philadelphia, Pa.
MACFARLANE, JAMES.....Hebron, Larimer Co., Colo.
MANSON, MARSDEN.....88 Flood Bldg., San Francisco, Cal.
McCANN, THOMAS H.....Second National Bank Bldg., Hoboken, N. J.
McKENZIE, T. H.....State Board of Health, Southington, Conn.
MENOCAL, A. G.....Civil Engineer, U. S. N., Navy Yard, Norfolk, Va.
MERSEREAU, C. V.....Vice-President, Hill-O'Meara Construction Company, Equitable Building, St. Louis, Mo.
MORSE, FOSTER B.....Chief Engineer, W. N. B. & N. R. R. Wilmington, N. C.
NOURSE, EDWIN G.....Potomac Flats, 30th St. and Michigan Ave., Chicago, Ill.
PARKER, ANDREW McCLEAN.....First Assistant Engineer, Dept. of Docks, Pier A, North River, New York City.
PARKHURST, H. W.....Engineer of Bridges, Illinois Central R. R., Central Station, Chicago, Ill.
POST, L. W.....N. E. cor. Fourth Ave. and 22d St., New York City.
RIFFLE, A. S.....Oregon Bridge Co., McKay Bldg., Portland, Ore.
ROBERTS, E. P.....Carmel, Putnam Co., N. Y.
ROGERS, FAIRMAN.....Engineering Library, University of Pennsylvania, Philadelphia, Pa.
SAVAGE, A. C.....300 Eleventh St., Brooklyn, N. Y.
SCHNEIDER, C. C.....Chief Engineer, Pencoyd Bridge and Construction Co., Pencoyd, Pa.
SEARLES, WILLIAM H.....4 Case Block, Cleveland, O.
SEARS, ALFRED F.....15 Cortlandt St., New York City.
SHAILER, ROBERT A.....611 Western Union Bldg., Chicago, Ill.
SMITH, FREDERICK H.....216 Equitable Bldg., Baltimore, Md.
STRONG, CHARLES H.....802 The Cuyahoga, Cleveland, O.
SWAN, CHARLES H.....110 Boylston St., Boston, Mass.
TOMLINSON, A. T.....54 Herkimer St., Brooklyn, N. Y.
WHEELER, S. S.....39 Cortlandt St., New York City.
WRIGHT, CHARLES H.....Edge Moor Bridge Works, Wilmington, Del.

ASSOCIATE MEMBERS.

ABBOT, F. W.....620 Chestnut St., Room 21, St. Louis, Mo.
AYCRIGG, WILLIAM A.....102 Chambers St., New York City.
CARLL, DAVID S.....Chief Engineer, W. & G. R. R., Washington, D. C.
GROVER, ALVA J.....1137 Park Ave., Omaha, Neb.
HAWLEY, W. C.....(Care Board of Water Commrs.), 47 State St., Troy, N. Y.

HEMMING, D. W.....Box 407, White Plains, N. Y.
HILL, EDWIN A.....Assistant to Receivers, Jacksonville South Eastern Line, Jacksonville, Ill.
HILL, JOHN E. .....60 E. Buffalo St., Ithaca, N. Y.
KYLE, GEORGE A.....91 York St., Cincinnati, O.
MOORE, CHARLES H.....313 Girard Bldg., Philadelphia, Pa.
PORTER, A. H.....Johnson and Porter, Niagara Falls, N. Y.
POTTER, ALEXANDER.....137 Broadway, New York.
ROSENBERG, F.....13 Hale Bldg., Philadelphia, Pa.
VEDELER, G. H.....154 East 127th St., New York City.
WATSON, WALTER.....Engineer's Office, C. & W. M. Ry., Grand Rapids, Mich.
WERNER, E. A.....132 Center St., Chicago, Ill.

ASSOCIATES.

BROWN, JACOB B.....Wallingford, Pa.
BURNHAM, GEORGE, Jr.....Treasurer Baldwin Locomotive Works, Philadelphia, Pa.
DAVIS, J. WOODBRIDGE.....417 Madison Ave., New York City.
FUTAMI, KIOSABURO.....Fukuikencho, Fukui, Japan.
GIBSON, WILLIAM, Jr.....248 Claremont Ave., Brooklyn, N. Y.
HUNSIKER, M.....Engineer of Tests, The Carnegie Steel Co., Ltd., 48 Fifth Ave., Pittsburgh, Pa.
SAEGER, CHARLES M.....1320 Hamilton St., Allentown, Pa.
STONE, WATERMAN.....Box 132, Providence, R. I.

JUNIORS.

ADAMS, JULIUS L.....Dept. of Public Works, Yonkers, N. Y.
BARNSLEY, GEORGE T.....Olney, Md.
BERRALL, JAMES.....P. O. Box 742, Montclair, N. J.
BOECKLIN, WERNER, Jr.....(Care C. O. & S. W. R. R.), Louisville, Ky.
BURDETT, CHARLES L.....2 Central Row, Hartford, Conn.
CHRISTY, GEORGE L.....447 West 23d St., New York City.
COMSTOCK, C. W.....60 E. Buffalo St., Ithaca, N. Y.
DURYEA, EDWIN, Jr.....Carmel, N. Y.
FAIRCHILD, J. F.....Bank Bldg., Mt. Vernon, N. Y.
FERGUSON, WILLIAM L.....1632 North 15th St., Philadelphia, Pa.
FULLER, WILLIAM B.....53 State St., Room 412, Boston, Mass.
HAMILTON, M. CLARK.....Roadmaster, Hartford Div. N. Y., N. H. & H. R. R., Hartford, Conn.
HOYT, J. T. N.....21 Paris Ave., Grand Rapids, Mich.
JEWETT, CHARLES H.....70 Fourth Ave., Newark, N. J.
KINSEY, WARREN RUE.....10 South St., Newark, N. J.
LENTILHON, EUGENE.....36 West 11th St., New York City.
MICHIE, W. R.....Assistant Engineer of Construction, Pennsylvania R. R., Washington, D. C.
MOORE, E. C.....Purdy's Station, N. Y.

ROGERS, W. A. ..... 156 Chicago St., Elgin, Ill.
SIRRINE, J. E. ..... 168 McBee Ave., Greenville, S. C.
SMITH, PEMBERTON. ..... New York Central Depot, Room 18, Albany, N. Y.
SWEITZER, N. B., Jr. ..... Engineer, Love Electric Traction Co., The Richmond, Washington, D. C.
VAN CLEVE, A. H. ..... 226 Fifth St., Niagara Falls, N. Y.
WHEATLEY, A. C. ..... Bartholomew House, London, E. C., England.
WOOD, CHARLES F. ..... Knoxville, Tenn.
YORK, H. W. ..... Chief Engineer, United Electric Light and Power Co., Vanderbilt Bldg., New York City.
ZELLER, A. H. ..... City Hall, St. Louis, Mo.

FELLOWS.

CLARK, EDWARD W. ..... Bullitt Bldg., Philadelphia, Pa.
DE GARAY, FRANCISCO. ..... Tlaxpana 21, Mexico, Mexico.

DEATHS.

LONG, DENNIS. ..... Elected Fellow, March 28th, 1872; died October 8th, 1893.
LOVECRAFT, FREDERICK AARON ..... Elected Fellow, November 1st, 1892; died October 26th, 1893.
SMITH, DAVID LOWBER. ..... Elected Member, May 4th, 1887; died October 10th, 1893.
WALKER, WILLIAM WILLIAMS. ..... Elected Member, October 6th, 1880; died September 23d, 1893.

DROPPED.

MEMBER.	Date of Action of the Board.
SAABYE, OSCAR	October 31st, 1893.

ADDITIONS TO

LIBRARY AND MUSEUM.

From Onward Bates, Chicago, Ill.:
Instructions for Employees of the Bridge and Building Department, C. M. & St. P. R. R.

From Buffalo Forge Company, Buffalo, N. Y.:
Illustrated General Catalogue.

From S. A. Bullard, Springfield, Ill.:
Report of the Eighth Annual Meeting of the Illinois Society of Engineers and Surveyors.

From Chamber of Commerce, Frankfort, Germany:
Annual Report for 1892.

From C. E. Fowler, Youngstown, O.:
Specifications for Roofs and Iron Buildings and for Highway Bridge for the Youngstown Bridge Company.

From Hoboken Ferry Company:
The First Screw-Propeller Boats to Navigate the Waters of any Country.

From Institution of Mechanical Engineers, London, Eng.:
Proceedings, April, 1893.

From McGill University, Montreal, Can.:
Description of the Engineering and Physics Building.

From W. Beswick Myers, London, Eng.:
Three Photographs of Bridges over the Aire and Calder Canal.
The "Schwedler" Bridge.

From George S. Morison, Chicago, Ill.:
The Nebraska City Bridge.

From Michigan Mining School, Lansing, Mich.:
Reports of the Directors for 1890-92.

From E. P. North, N. Y.:
Accidents to Horses on Carriage-Way Pavements.
Analysis and Use of Coal Gas.
Analysis of the Fink, Murphy, Bollman and Triangular Trusses.
Asphalt and Wood Pavements, London.
Bridging the Mississippi River between St. Paul and St. Louis.
Commercial Freedom for the Mississippi Valley.
Columbia Conduit Company.
Compressed Asphalt Block Pavement.
Chicago Main Drainage Canal.
Description of the Iron Bridge over the Connecticut River on the Hartford and New Haven R. R.
Description of the Boston Water Works.
Economy of Road Maintenance through Steam Road-Rollers.
Economic Theory of the Location of Railways.
Experiments on Fagersta Steel.
Fox and Wisconsin Rivers Improvement.
Gas-Consumer's Guide.
Geological Survey of the Adirondack Region of New York.
Gaugings made in 1856 and 1857 of the Sources of Water Supply for Brooklyn Water Works.
Handbook for Locomotive Engineers.
Hydraulic Lime of Teil.
Improvements in Westchester County, N. Y.
Iron Manufactures in Sweden in 1876.
Improved Wood Pavement Company.
Lecture on Water. Chandler.
Marine Steam Engines.
Map of the U. S. Territories, Pacific R. R. Routes, 1867.
Notes of the Inspector General, Ponts et Chaussées, on the works of Paris.
Note sur les Chapes de Voûtes, 1875.
Notice sur les Compresseurs à Vapeur.
Notices on the Models, etc., relating to the work of Ponts et Chaussées, Centennial Exposition.
Nagle Pumping Engine.
Narrow Gauge for the Rhode Island and Massachusetts R. R.
Our Railways.
Papers relating to Traction Engines.
Practical Tunneling.
Railway Gauges.
Recent Changes in Central Park, N. Y.
Recent Improvement in the Steam Engine.

Reports:
Board of Public Works, Chicago, 2d, 8th, 9th, 10th.
Board of Commissioners of the Department of Public Parks, N. Y., 1871, 1872, 1873.
Chief of Bureau of Steam Engineering, 1867.
Chief Engineer of the Illinois and St. Louis Bridge Company, 1871.
Chief of Engineers, U. S. A., 1867, 1871, 1873, 1875-77.
Department of Docks, N. Y., 1877.
Department of Public Works, N. Y., 1877, 1878, 1879.
Lake Shore and Michigan Southern R.R., 1870.
Louisville Bridge Company, 1871.
Michigan Southern and Northern Indiana R. R. Co., 1868.
Nassau Water Department, 1870, 1871, 1872.
Newark Aqueduct Board, 1879.
New York Bridge Company, 1872.
On Bulkhead Walls at Canal and King Streets, N. Y.
On Geological Map of Massachusetts.
On Preliminary Scheme for the Improvement of Staten Island.
On Proposed New Water Works for Hoboken, N. J.
On Pumping Engine, Lawrence Water Works.
On Pumping Engine, Milwaukee Water Works.
On Sewerage for Boston, Mass.
On Sewerage for Brookline, Mass.
On Sewerage for Providence, R. I.
On Water for Locomotives.
On Water Supply from the Tully Lakes.
On Water Supply for San Francisco, Cal.
On Wood and Asphalt Pavements.
Paris Universal Exposition, 1878.
Pittsburgh New Water Works, 1871.
Troy and Greenfield R. R., 1867, 1868, 1869.
Rock Asphalt and Concrete.
Ross Combined Steam Ram and Road-Roller.
Ross Road Machine.
Smithsonian Reports, 1873, 1874, 1875.
Specifications:
Engine House for the Roxborough Water Works, Philadelphia, 1866.
Drains, Sewers, etc., Department of Parks, N. Y.
Pavements in Jassy.
Pavement in Paris.
Stevens' Battery.
Steel Rails.
Tri-Nitro-Glycerine.
Van Nostrand's Electric Engineering Magazine, Vols. I to VII.
Wrought and Cast Iron.
Worthington Duplex Engine.

From Patent Office, London, Eng.:
Abridgments of Specifications for Patents for Inventions.

From Public Library, Cincinnati, O.:
Annual Reports of the Librarian and Treasurer for the year ending June 30th, 1893.

From Railway Commissioners, New South Wales:
Annual Report for the Year ending June 30th, 1893.

From State Agricultural College, Fort Collins, Cal.:
Bulletins Nos. 18, 19, 20.

An Outline of the Course of Study and Work in the Mechanical Department. Fourteenth Annual Catalogue, 1892-93.

From Martin Schenck, Albany, N. Y.:
Report of the State Engineer and Surveyor, 1892.

From Frank W. Skinner, N. Y.:
American Methods of Bridge Construction.

From Society of Engineers, London, Eng.:
Transactions, 1892, and General Index, 1861-92.

From Surgeon-General, U. S.:
Index Catalogue to Library, Vol. XIV.

From F. J. E. Spring, Bombay, India:
Northwestern Provinces and Oudh Railway Bridge over the Godavari River, at Rajahmandri.
Kistna Bridge, Bezwada.
Kistna Bridge.
Surplus Stores of State Railways and their Disposal.
The Sher Shah Bridge over the Chinab River, near Multan, Punjab, India.

From U. S. Bureau of Education:
Handbook of University Extensions.

From U. S. Navy Department:
Pilot Chart of the North Atlantic Ocean, October, 1893.
The International Columbian Naval Rendezvous and Review of 1893.

From U. S. Treasury Department:
Summary Statement of the Imports and Exports of the United States, August, 1893.

From E. A. Ziffer, Vienna, Austria:
Mittheilungen des Vereins für die Förderung des Local und Strassenbahnwesens, Parts I to V.
Ueber die schmalspurigen steiermärkischen Landesbahnen.
Ueber die Stellung und Ausbildung der Techniker. Satzungen des Vereins für die Förderung des Local und Strassenbahnwesens.

American Society of Civil Engineers.

OFFICERS FOR 1893.

President, WILLIAM METCALF.

Vice-Presidents—Term expires January, 1894:
CHARLES B. BRUSH, SAMUEL WHINERY.

Vice-Presidents—Term expires January, 1895:
CHARLES MACDONALD, ELMER L. CORTHELL.

Secretary, FRANCIS COLLINGWOOD.

Treasurer, JOHN BOGART.

Directors,

Term expires January, 1894:

THEODORE N. ELY, GEORGE W. McNULTY. ROBERT MOORE, O. F. NICHOLS, P. ALEX. PETERSON, ROBERT L. READ.

Term expires January, 1895:

LEFFERT L. BUCK, WM. P. CRAIGHILL, DESMOND FITZGERALD, ABRAHAM GOTTLIEB, BENJAMIN M. HARROD, JOHN THOMSON.

Term expires January, 1896:

FOSTER CROWELL, HENRY G. PROUT, WILLARD S. POPE, FREDERIC P. STEARNS, JOHN T. FANNING, OLIN H. LANDRETH.

Past Presidents, Members of the Board:

JULIUS W. ADAMS, GEORGE S. GREENE, ALBERT FINK, CHARLES PAINE, DON J. WHITTEMORE, HENRY FLAD, WM. E. WORTHEN, THOMAS C. KEEFER, M. J. BECKER, O. CHANUTE, MENDES COHEN.

Assistant Secretary, CHARLES WARREN HUNT.

Auditor, THOMAS B. LEE.

Standing Committees.

***On Finance*:**—Charles B. Brush, Charles Macdonald, L. L. Buck, S. Whinery, Wm. P. Craighill.

***On Library*:**—G. W. McNulty, Theodore N. Ely, Benjamin M. Harrod, Henry G. Prout, Olin H. Landreth

***On Publications*:**—O. F. Nichols, Desmond FitzGerald, Elmer L. Corthell, Foster Crowell, Frederic P. Stearns.

Special Committees.

THE PRESIDENT OF THE SOCIETY IS *ex-officio* MEMBER OF ALL COMMITTEES.

ON UNIFORM STANDARD TIME:—Sandford Fleming, Charles Paine, Theodore N. Ely, J. M. Toucey, T. Egleston.

ON UNIFORM METHODS OF TESTING MATERIALS USED IN METALLIC STRUCTURES, AND ON REQUIREMENTS FOR THESE MATERIALS TO FURTHER IMPROVE THE GRADE OF SUCH STRUCTURES:—William H. Burr, J. G. Dagron, R. W. Hunt, H. G. Morse, Percival Roberts, Jr., Henry B. Seaman.

ON UNITS OF MEASUREMENT:—George M. Bond, S. S. Wheeler, E. Sherman Gould, George W. Plympton.

MEETINGS.

Regular Meetings, on the first and third Wednesdays of the month, at 20 o'clock, except during July and August.

The rooms of the Society are open from 9 to 17 o'clock each business day, except Saturday (when they are closed at 15 o'clock), and at other times on application to the Janitor.

HOUSE OF THE SOCIETY—127 EAST TWENTY-THIRD STREET, NEW YORK.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XIX.—November, 1893.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to Members.)

OF THE SOCIETY.

NOVEMBER 1ST, 1893.—The Society met at 20 o'clock, President William Metcalf in the chair; F. Collingwood, Secretary.

Ballots were canvassed, and the following candidates were declared elected: As Members, Ernesto Joaquin Balbin, Havana, Cuba; Edward Benjamin Cushing, Houston, Tex.; Hartwell Prentice Farrar, Jackson, Tenn.; John Joseph McLaughlin, Jamaica, N. Y.; Charles Adam Mixer, Rumford Falls, Me.; Walter Frank Randall; Syracuse, N. Y.; Curtis McDonald Townsend, Memphis, Tenn. As Associate Members, George Dana Hersey, Youngstown, O., and Morris Sherman Towson, Cleveand, O.

The following communications were read by the Secretary:

"CHICAGO, ILL., October 9th, 1893.

The representatives in Chicago of the German Engineering Society passed the following resolutions:

Whereas, A number of engineering societies of the United States and Canada have maintained joint engineering headquarters during the Columbian Exposition, both at 10 Van Buren Street and at the Exposition, and have there cordially received such foreign engineers as have visited Chicago, and

Whereas, The German Engineering Society (Verein Deutscher Ingenieure) has found these engineering headquarters of material assistance in obtaining information, in obtaining introductions to various establishments and works and in meeting American engineers;

Therefore, resolved, That the thanks of the German Engineering Society (Verein Deutscher Ingenieure) are hereby tendered to the various societies which have jointly maintained these headquarters, and which I understand to be the following:

The American Society of Civil Engineers, New York City.
The American Institute of Mining Engineers, New York City.
The American Society of Mechanical Engineers, New York City.
The Canadian Society of Civil Engineers, Montreal, Can.
The Engineers' Club of Philadelphia, Philadelphia, Pa.
The Boston Society of Civil Engineers, Boston, Mass.
The Engineers' Association of the South, Nashville, Tenn.
The Civil Engineers' Club of Cleveland, Cleveland, O.
The Engineers' Society of Western Pennsylvania, Pittsburgh, Pa.
The Engineers' Club of St. Louis, St. Louis, Mo.
The Engineers' Club of Kansas City, Kansas City, Mo.
The Montana Society of Civil Engineers, Helena, Mont.
The Civil Engineers' Society of St. Paul, St. Paul, Minn.
The Engineers' Club of Minneapolis, Minneapolis, Minn.
The Western Society of Engineers, Chicago, Ill.
The Scandinavian Engineering Society, Chicago, Ill.

Resolved, That the President and Secretary of the joint association be requested to transmit to each of the above-named societies a copy of these resolutions.

For the German Engineering Society,
Prof. W. HARTMANN."

"OESTERREICHISCHER INGENIEUR UND ARCHITEKTEN-VEREIN, VIENNA.

To the Honorable General Committee of the Engineering Societies, Chicago:

The friendly reception which the members of this Society have been accorded on the part of the Associated Engineering Societies in Chicago, and from engineering societies in other American cities, during their visit to the Columbian Exposition, prompts the President of the Austrian Society of Engineers and Architects to tender in the name of the Society hearty thanks to the General Committee, as the representative of all engineering societies in the United States, for their kind reception, as well as for the many facilities which have been offered members of this society to study the industrial works of the United States.

The honorable General Committee is requested to transmit the thanks of this society to the engineering societies composing the Association, and to receive the assurance that the Austrian Society of Engineers and Architects will always consider it a pleasure to cordially receive any American engineers who may visit Vienna.

With great respects,
Yours truly,
The President of the Society,
F. VON GRUBER.
K. K. Hofrath.

VIENNA, September 30th, 1893."

The following deaths were announced: Dennis Long, elected Fellow March 28th, 1872; died October 8th, 1893. F. A. Lovecraft, elected Fellow November 1st, 1892; died October 26th, 1893.

The Secretary read an abstract of a paper by R. Montfort, M. Am. Soc. C. E., on "Protection of Piles against the Teredo Navalis on the Louisville and Nashville Company's Lines," and discussion followed by Messrs. George H. Thomson, James Duane, George Hill, A. McC. Parker, Richard Lamb, John A. McDonald, H. Comer, H. W. Brinckerhoff, F. Collingwood, Charles Macdonald and Samuel Whinery.

NOVEMBER 15TH, 1893.—The Society met at 20 o'clock, Vice-President Charles B. Brush in the chair; F. Collingwood, Secretary.

C. R. Grimm, M. Am. Soc. C. E., presented a paper on "The Tower of the New City Hall at Philadelphia, Pa.," and a discussion in writing was presented from Joseph M. Wilson, M. Am. Soc. C. E. The paper was also discussed orally by Messrs. J. Foster Flagg, George H. Thomson, J. M. Porter, George Hill, Wm. Barclay Parsons, L. L. Buck, O. F. Nichols, J. A. McDonald and C. R. Grimm.

OF THE BOARD OF DIRECTION.

OCTOBER 31ST, 1893.—Applications were considered and other routine business transacted.

Committees to award the Norman Medal and the Rowland Prize were appointed.

A delegate was appointed to represent the Society at the Congress of Hygiene and Demography at Buda-Pesth.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.		Date of Membership
McLAUGHLIN, JOHN JOSEPH	Jamaica, N. Y.	Nov. 1, 1893
MIXER, CHARLES ADAM	Chief Engineer Rumford Falls Power Co., Rumford Falls, Me.	Nov. 1, 1893
PETTIGREW, THOMAS	Chief Engineer Ohio River R. R., Parkersburg, W. Va.	Oct. 4, 1893
TOWNSEND, CURTIS McDONALD	Capt. Corps of Engineers, U. S. A., 106 Madison St., Memphis, Tenn.	Nov. 1, 1893
WARNER, EDWIN HALL	506 Bailey Bldg., Seattle, Wash.	Assoc. M. May 6, 1891 M. Oct. 4, 1893
YEATMAN, POPE	Merchants' National Bank, St. Louis, Mo.	Oct. 4, 1893

ASSOCIATE MEMBERS.

TEMPLE, JOHN FREDERIC	Chief Draftsman A., T. & S. F. Ry., 48 Santa Fé Bldg, Topeka, Kans.	J.	Feb.	5, 1890
		Assoc. M.	Oct.	4, 1893
TOWSON, MORRIS SHERMAN	1717 Euclid Ave., Cleveland, Ohio		Nov.	1, 1893

JUNIORS.

FARLEY, PHILIP PATRICK	980 De Kalb Ave., Brooklyn, N. Y.	Oct.	31, 1893
POLAND, WILLIAM BABCOCK	Assistant Engineer C. C. C. & St. L. Ry., Indianapolis, Ind.	Oct.	31, 1893

CHANGES AND CORRECTIONS.

MEMBERS.

BACOT, WILLIAM S. ..... 135 Broadway, New York City.
BURR, WILLIAM H. ..... 161 West 74th St., New York City.
CALKINS, FRANK A. ..... 1363 C. P. Boulevard, Chicago, Ill.
CUNNINGHAM, DAVID W. ..... 641 Greenup St., Covington, Ky.
FOLLETT, WILLIAM W. ..... Cocorit, Sonora, Mexico, *via* Nogales.
GILLETTE, E., Jr. ..... (E. Gillette & Co.), Sheridan, Wyo.
GOULD, WILLIAM T. ..... Principal Assistant Engineer N. O. & N. W. Ry., Rayville, La.
HARDING, GEORGE EDWARD. ..... 252 Broadway, New York City.
HILGARD, K. EMIL ..... Engineer of Bridges, N. P. R. R., General Office Bldg., St. Paul, Minn.
KELLEY, WILLIAM D. ..... 90 World Bldg., New York City.
LUDLOW, WILLIAM. ..... Major of Engineers, Bvt. Lt.-Col., U. S. A., U. S. Legation, London, England.
MORSS, FOSTER B. ..... Front Royal, Va.
PURDON, CHARLES D. ..... A., T. & S. F. R. R., Ft. Madison, Iowa.
ROOD, HENRY M. ..... Lakewood, N. J.
SCHERZER, ALBERT J. ..... (Care W. H. Harned), 136 South 4th St., Philadelphia, Pa.
SEWALL, JOSEPH S. ..... 145 Arcade Bldg., St. Paul, Minn.
TOMPKINS, J. A. B. ..... 1810 Clybourn St., Milwaukee, Wis.
WAGNER, SAMUEL TOBIAS. ..... 418 City Hall, Philadelphia, Pa.

ASSOCIATE MEMBERS.

ARENTZ, F. C. H.....Agent Milwaukee Bridge and Iron Works, Evansville, Indiana.
BETTES, CHARLES R.....Queens Co. Water Co., Schmuck Bldg., Far Rockaway, N. Y.
FOLWELL, A. PRESCOTT.....403 Washington Ave., Brooklyn, N. Y.
HEALY, JOHN F.....Cokedale, Wash.
KIRKPATRICK, W. G.....35 Woodland Park, Cottage Grove Ave., Chicago, Ill.

JUNIORS.

BLODGETT, JOHN.....State Board of Health, 13 Beacon St., Boston, Mass.
CARRÈRE, J. MAXWELL.....Union Trust Bldg., Broadway, New York City.
MCCORMICK, GEORGE K.....509 Craig St., Knoxville, Tenn.
MICHIE, W. R.....Assistant Engineer Pennsylvania R. R., Johnstown, Pa.
SIRRINE, J. E.....117 East 35th St., New York City.
STANFORD, H. R.....207 Niagara St., Buffalo, N. Y.
TREADWELL, LEE.....(Care J. A. L. Waddell), Keith and Perry Bldg., Kansas City, Mo.
TUCKER, WILLIAM C.....Englewood, N. J.
ROUSSEAU, H. H.....Pittsburgh Bridge Co., Pittsburgh, Pa.

DEATHS.

CLEEMANN, THOMAS MUTTER.....Elected Member October 1st, 1879; died November 16th, 1893.
MARTIN, ROBERT KIRKWOOD.....Elected Member June 1st, 1892; died November 24th, 1893.

ADDITIONS TO

LIBRARY AND MUSEUM.

From American Institute of Mining Engineers:
- A Furnace with Automatic Strokes, Traveling Grate and Variable Blast.
- A New Process for the Purification of Pig Iron.
- Electricity in Mining.
- Experimental Investigations on the "Loss of Head" of Air Currents in Underground Workings.
- Further Observations on the Relations between the Chemical Constitution and Physical Character of Steel.
- International Engineering Congress. List of Papers.
- Iron Alloys with Special Reference to Manganese Steel.
- Microstructure of Steel.
- On Paper by Dr. Jenney on the Lead and Zinc Deposits of the Mississippi Valley.
- Review of American Blast Furnace Practice.
- Sulphur in Cast Iron.
- The Existence of Faults and Dislocations in the Lead and Zinc Regions of the Mississippi Valley.
- The Genesis of Ore Deposits.
- The Microstructure of Ingot Iron in Cast Ingots.

American Institute of Mechanical Engineers:
- Advance Papers, Nos. DLVIII to DLXXVII.

From C. P. Bassett, Newark, N. J.:
- A High and Low Service Stand Pipe at Atlantic Highlands, N. J.

From Board of Public Works, Duluth, Minn.:
- Sixth Annual Report for the year ending February 28th, 1893.

From Boston Public Library:
- Bulletin, October, 1893.

From California Academy of Science, San Francisco, Cal.:
- Occasional Papers No. 4.
- Proceedings, Second Series, Vol. III.

From O. M. Carter, Savannah, Ga.:
- Annual Report upon the Improvement of Rivers and Harbors in Eastern Georgia.

From Canadian Institute, Toronto, Canada:
- Transactions, September, 1893.
- Fifth Annual Report, Session, 1892-93.

From William Henry Chandler, Bethlehem, Pa.:
- Reports on Universal Exposition at Paris, 1889, viz.:
  - Appliances and Methods employed for the Preservation of Wood.
  - Hygiene and Public Charities.
  - Products of Mining and Metallurgy.
  - The Construction of Chemical Laboratories.
  - Textile Fabrics, Wearing Apparel and Accessories.

From Cornell University, Ithaca, N. Y.:
- Annual Report of the President, 1892-93.

From Fred. De Land, Chicago, Ill.:
- Synoptical Index of Current Technical Literature, November, 1893.

From Engineers' Club of Philadelphia:
- Annual Report of the Bureau of Gas, of Waters and of Surveys, for 1892.
- Blue-Print Outline Map of Portions of Pennsylvania and New Jersey.
- Columbian Edition of "Philadelphia and its Environs, 1893."
- Geological Map of the Philadelphia Belt of the Azoic Rocks.
- List of Beacons, Buoys and Day Marks, 4th Lighthouse District.
- List of Lights and Fog Signals on the Atlantic and Gulf Coasts of the United States.
- Location of Quarantine: its Geographical Relation to Philadelphia.
- Map of the Proposed Railroad and Branches to County Lines of the Philadelphia Belt Line R. R. Co.
- Map of the City of Philadelphia, 1887.
- Map showing the Course of the great Terminal Moraine Across Pennsylvania, 1881.
- New Official Guide Map of Philadelphia.
- Plan showing improvements in the 21st, 22d and 34th Wards, Philadelphia.
- Public Ledger Almanac, 1893.
- Philadelphia Business Directory, 1893.
- Receiving and Delivering Station for Freight in the City of Philadelphia, P. R. R. Co.
- Souvenir of the Convention of the American Water Works Association, 1891.
- The Philadelphia and Reading Railroad in Philadelphia.
- Topographical Map of the Wyoming and Lackawanna Valley in the Northern Coal Field.

From Roberto Gayol, Mexico, Mexico:
- Projecto de Desague y Saneamiento de la Ciudad de Mexico.

From Ginn & Co., Boston, Mass.:
- A Field Book for Civil Engineers.

From C. E. Grunsky and Marsden Manson, San Francisco, Cal.:
- Progress Report of the Engineers in Charge to Devise and Provide a System of Sewerage for the City and County of San Francisco for the fiscal year ending June 30th, 1893.

From J. J. Grinlinton, Commissioner for Ceylon, Chicago, Ill.:
- Official Handbook and Catalogue of the Ceylon Courts, World's Columbian Exposition.

From Charles W. Gay, Lynn, Mass.:
- Annual Report of the City Engineer of the City of Lynn, Mass., for 1892.

From Guatemala Scientific Society:
- Revista Mensual, Vol. I, No. 12.

From M. L. Holman, St. Louis, Mo.:
Annual Report of the Water Commissioner of the City of St. Louis for the year ending April, 1893.

From Ludwig Huss, Vienna, Austria:
Mittheilungen über die Grossen Gewölbten Brücken der k. k. Staatsbahn Stanislau-Woronienka.

From Chas. L. Hutchinson, Commissioner for Greece, Chicago, Ill.:
The Mining and Metallurgical Industries of Laurium.
Official Catalogue (Greece) World's Columbian Exposition.
The Martin-Siemens Furnaces.

From Institution of Civil Engineers, London, Eng.:
Abstracts of Papers in Foreign Transactions.
Brief Subject Index, Vol. LIX to CXIV.
Glasgow Central Railway.
Independence of Abstract Science and Engineering.
Impounding Reservoirs in India.
Irrigation in the United States.
List of Members.
Manufacture of Armor Plates.
Measurement of Water over Weirs.
Minutes of Proceedings, Vol. CXIV.
Modern Fixed Ammunition.
One Hundred and Sixty Ton Hydraulic Crane at Malta Dock Yard.
River Piers of the Memphis Bridge.

From Imperial University of Japan, Tokio, Japan:
Calendar for the year 1892-93.

From International Maritime Congress, London, Eng.:
Minutes of Proceedings, General Report, etc.

From J. B. Johnson, C. W. Bryan and F. E. Turneaure:
The Theory and Practice of Modern Framed Structures.

From Wm. Pierson Judson, Oswego, N. Y.:
Rules for the Plumbing, Drainage and Ventilation in the City of Oswego, N. Y.

From Alexis A. Julien, N. Y.:
Notes of Research on the New York Obelisk.

From E. H. Keating, Toronto, Canada:
Annual Report of the City Engineer, Toronto, for 1892.
Report on Proposed Enlargements and Improvements of Toronto Water Works.

From A. Lietz Company, San Francisco, Cal.:
Manual of Modern Surveying Instruments and their Uses.

From McGill University, Montreal, Canada:
Annual Calendar for 1893-94.

From Master Car Builders' Association:
Report of Proceedings, 1893.

From Elwood Mead, Cheyenne, Wyo.:
First Biennial Report of the State Engineer to the Governor of Wyoming, 1891 and 1892.

From P. de Murguiondo, Baltimore, Md.
Treatise on the South American Railways and the Great International Lines.
La Republique de l'Uruguay.
The Oriental Republic of Uruguay.

From E. P. North, New York:
Porto di Genova, Exposition of Palermo, 1892.
Jahres Bericht für 1892. Handelskammer zu Frankfurt-am-Main.
Beschreibung der Frankfurter Hafenlage.
Bericht über die Verhandlungen des V. Binnenschiffahrts-Congresses in Paris, 1892.

From Albert F. Noyes, Newton, Mass.:
Annual Report of the City Engineer of Newton, Mass., for 1892.

From Ohio Society of Surveyors and Civil Engineers:
14th Annual Report, Jan. 17th, 18th, 19th, 1893.

From Jas. Perrenou, Commissioner for Switzerland, Chicago, Ill.:
Die Unentgeltlichkeit der individuellen Lehrmittel und Schulmaterialien in den Schweizerischen Volksschulen.
Over the Alps *via* the St. Gothard Railway.
Official Catalogue of Swiss Exhibitors, World's Columbian Exposition, 1893.

From Patent Office, London, Eng.:
Abridgments of Specifications, 15 parts.

From R. W. Roberts, Saginaw, Mich.:
Third Annual Report of the Board of Public Works of the City of Saginaw, for the year ending January 1st, 1893.

From Miguel Serrano, Commissioner from Mexico, Chicago, Ill.:
Los Estados Unidos Mexicanos, sus condiciones naturales y sus elementos de prosperidad.
Datos Mercantiles, Estados Unidos Mexicanos.
Mexico ante los Congresos Internacionales Pentitenciarios.
Mexico: its Trade, Industries and Resources.
Commission Geographique Exploratrice de la Republique Mexicaine.
Memoria para una Bibliografia Cientifica de Mexico en el siglo XIX.
National School for the Deaf and Dumb, Mexico.
Reglamento del Instituto Medico Nacional.
La Mexique a la partee des industriels, etc.
La Fiesta de los Tastoanes.
Caja Telefonica Automatica.
Reformas Introduciades en el Sistema de Telefonos.
Microfono y Microtelefono.

From State Board of Health, Boston, Mass.:
Twenty-fourth Annual Report, 1892.

From U. S. Coast and Geodetic Survey:
Fundamental Standards of Lengths and Measurements.
Results of Observations for the Variations of Latitude at Waikiki, Hawaiian Islands.

From U. S. Department of the Interior:
Report on the Population and Resources of Alaska at the Eleventh Census.
Statistics of Public Libraries in the United States and Canada.

From U. S. Department of Labor:
Sixth Special Report of the Commissioner of Labor. The Phosphate Industry of the United States.

From U. S. Department of State:
Consular Report, September, 1893.
Commercial Relations of the United States with Foreign Countries during the years 1891 and 1892.
Principal Exports to the United States declared at the several Consulates.

From U. S. Navy Department:
Weather Conditions of Two Cyclones of August, 1893.
Annual Report of the Chief of the Bureau of Steam Engineering, 1893.

From U. S. Treasury Department:
Quarterly Report of Imports, Exports, etc., for three months ending June 30th, 1893.
Summary Statement of the Imports and Exports of the United States.

From U. S. War Department:
Twelve Specifications for the Improvement of Certain Rivers and Harbors.

From University of the State of New York:
One Hundred and Fifth Annual Report for 1891.
Seventy-fourth Annual Report on New York State Library.
Regent's Bulletin, No. 21, May, 1893.

From Lt.-Colonel C. J. Ward, Commissioner for Jamaica, Chicago, Ill.:
Handbook of Jamaica, 1893.
Jamaica at Chicago. An account descriptive of the Colony of Jamaica.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XIX.—December, 1893.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to Members.)

OF THE SOCIETY.

DECEMBER 6TH, 1893.—The Society met at 20 o'clock, President William Metcalf in the chair; F. Collingwood, Secretary.

Ballots were canvassed, and the following candidates were declared elected: As Members, William McLaurine Hall, Bowling Green, Ky.; Daniel Webster Mead (elected Associate Member July 1st, 1891), Rockford, Ill.; Corydon Tyler Purdy (elected Junior February 2d, 1887), Chicago, Ill.; Henry DeWitt Smith, Marshall, Tex. As Associate Members: Valentine Sherman Doebler, Hollidaysburg, Pa.; Charles Evan Fowler (elected Junior May 7th, 1890), Youngstown, O.

Announcement was made of the election by the Board of Direction, December 5th, of four Juniors.

The Secretary announced the death of the following Members: Thomas Mutter Cleemann, elected Member October 1st, 1879; died November 16th, 1893. Robert Kirkwood Martin, elected Member June 1st, 1892; died November 24th, 1893. Joseph Dilwyn Potts, elected Member August 5th, 1868; died December 3d, 1893.

A paper by Howard G. Kelley, M. Am. Soc. C. E., on "The Removal of a Defective Pivot Pier and Its Reconstruction," was read by the Secretary.

DECEMBER 20TH, 1893.—The Society met at 20 o'clock, Vice-President Charles B. Brush in the chair; F. Collingwood, Secretary.

A paper by Col. P. C. Hains, Corps of Engineers, U. S. A., M. Am. Soc. C. E., on "The Reclamation of the Potomac Flats, at Washington,

D. C.," was read by the Secretary. A written discussion by R. A. Cummings, Assoc. M. Am. Soc. C. E., was read by the Assistant Secretary, and the subject was discussed orally by Messrs. Crowell, J. D. Van Buren, H. W. Brinckerhoff, Gosling, Washburn, R. S. Buck and R. L. Harris.

OF THE BOARD OF DIRECTION.

DECEMBER 5TH, 1893.—The final decision of the post office authorities refusing to continue the pound rate for postage on the *Transactions* was announced.

The report of the Board of Direction to the Society was considered.

Additional nominations for officers of the Society were received under authority of Article VII, Section I, of the Constitution, and it was ordered that all such nominations be issued on the ballot list.

A letter was presented from Mr. A. Fteley absolutely declining and refusing to allow his name to be used as a candidate for the Vice-Presidency, and asking that it be omitted from the ballot list. As several of the Members who had signed the nomination of Mr. Fteley for the Vice-Presidency had subsequently signed a paper placing Mr. C. C. Martin in nomination for the same office, the Secretary was instructed to ask whether their intention had been to withdraw the name of Mr. Fteley, and in that case, not to send out Mr. Fteley's name on the ballot list.

Action was taken in the cases of Members in arrears for dues. Applications were considered and other routine business transacted.

The following Committee of Arrangements for the Annual Meeting was appointed: William J. Haskins, Howard J. Cole, Bernt Berger and Charles Warren Hunt.

MEMOIR OF DECEASED MEMBER.

WILLIAM CLARK YOUNG, Hon. M. Am. Soc. C. E.*

DIED DECEMBER 22D, 1893.

William C. Young was born November 22d, 1799, in Youngstown, in what was then known as the "Connecticut Western Reserve," now Ohio. His father was the founder of the town, having emigrated there from Whitesboro', N. Y., in 1797. The boyhood of Mr. Young was passed in Whitesboro', to which his parents returned when he was three years old. His early education was such as was to be had in the school of the place, which seems to have been superior to the ordinary village

*Abstracted from "Biography of William C. Young. N. Y., 1889."

school, for at the age of fourteen he had passed through the usual branches and had studied Latin grammar, geometry, trigonometry, mensuration and surveying. His first practical entry into the profession to which his life was to be devoted was with a surveying party whose work lay among the islands of Lake Ontario. Here he carried the compass and read the bearings to the chief of survey. In 1817, when only eighteen years old, he was appointed as one of the surveyors to locate the Erie Canal, and make the first surveys upon which to base plans and estimates.

In 1818, through the influence of a member of Congress, Mr. Young received an appointment as cadet at the United States Military Academy at West Point, from which he was graduated in 1822. He was commissioned as Lieutenant of Artillery and assigned to duty with the Second Artillery, stationed at Fort Mifflin, Pa.

After four years' service at Philadelphia, Norfolk and Washington, he resigned from the army and entered upon the profession of civil engineering. His first appointment was that of surveyor to a party of engineers engaged in making a survey of the Juniata route for the Pennsylvania Canal.

Mr. Young's first experience in railroad surveys was on the works of the extension of the Western Railroad of Massachusetts to the Hudson River. The commissioners appointed by the State of New York to have the surveys made at the expense of the State, and to furnish the State of Massachusetts with the reports, maps, etc., selected him to carry out the work, which he did, delivering the reports at Boston in person.

In 1830 he was appointed to inspect the construction of the roadbed of the Baltimore and Ohio Railroad, and a year later was made Resident Engineer of the Saratoga and Schenectady Railroad under John B. Jervis, Chief Engineer.

While upon this road Mr. Young brought in use the first cross-ties that were put into an American railroad.

The advantages gained by the introduction of cross-ties in lieu of the stone blocks and foundations formerly used were so great that their general adoption soon followed, thus marking an important point in the history of railroad construction.

Mr. Young's work on this road brought him into prominence, and led to his later appointment upon the Utica and Schenectady Railroad. He was Chief Engineer of Construction and Superintendent of Operation on this road for 14 years.

In 1849 he became Chief Engineer of the Hudson River Railroad, the grading and track of which were in progress as far as Poughkeepsie. His most important engineering work on this road was at Spuyten Duyvil Creek, where great difficulties had previously been encountered, owing to the insecure nature of the bed of the creek.

The roadbed had been made of stone filling, which sunk twice; for this Mr. Young substituted a cribwork of hewn timber partially filled with stone. This proved successful, and no further difficulty was met with.

In October, 1851, he was offered the presidency of the road, which he accepted, but retained it only till January, 1852, when he resigned and withdrew from the service of the company. In May of the same year he went to Panama to arrange for a contract for the completion of the railroad across the Isthmus, but was soon stricken with fever and was obliged to return. He was later elected President of the road, but retained the position only six months.

The New York Central Railroad Company in April, 1855, tendered Mr. Young the superintendency of the western division of their road, from Rochester to Buffalo, which was accepted by him. Difficulties, however, arose which obliged him to resign at the end of two years. This was the last public service of note which he rendered, and he never resumed the active pursuit of his profession, but lived a retired life in the house where he died.

Mr. Young had great command of the resources of his profession, and, with his great energy and indefatigable industry, combined with a comprehension of the needs of the public, he made himself an important factor in the development of the railroad system of the State where his life was passed. Had he retained his position in the army, from which he retired, his ability, courage and force of character would, without doubt, have won him high rank and distinction. He was the oldest living graduate of the Military Academy.

Mr. Young became an Honorary Member of the American Society of Civil Engineers March 1, 1892.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.		Date of Membership.
Balbin, Ernesto Joaquin	Ingenieur Via y Obras, Ferrocarriles Unidos de la Habana, Villanueva, Havana, Cuba	Nov. 1, 1893
Cushing, Edward Benjamin	Resident Engineer Southern Pacific Co., Atlantic System, Houston, Texas	Nov. 1, 1893
Farrar, Hartwell Prentice	Civil Engineer M. and O. R. R., Jackson, Miss	Nov. 1, 1893

HALL, WILLIAM McLAURINE.....	U. S. Assistant Engineer, Bowling Green, Ky.....		Dec.	6, 1893
MEAD, DANIEL WEBSTER.....	Engineer and General Manager Rockford Construction Co., Rockford Ill.	Assoc. M.	July	1, 1891
		M.	Dec.	6, 1893
PURDY, CORYDON TYLER.....	1110 The Rookery, Chicago, Ill.....	J.	Feb.	2, 1887
		M.	Dec.	6, 1893
SMITH, HENRY DEWITT.....	Marshall, Texas.....		Dec.	6, 1893

ASSOCIATE MEMBERS.

FOWLER, CHARLES EVAN.....	Chief Engineer Youngstown Bridge Co., 525 Bryson st., Youngstown, Ohio..	J.	May	7, 1890
		Assoc. M.	Dec.	6, 1893
PERRILLIAT, ARSÈNE.....	Assistant State Engineer, New Orleans, La.....		June	7, 1893

JUNIORS.

BRIGGS, WALDO CLAYTON.....	63 Clark st., New Haven, Conn.....	Dec.	5, 1893
CORY, HARRY THOMAS.....	Professor of Civil Engineering, Head of the Department, University of Missouri, Columbia, Mo.....	June	20, 1893
MYERS, JOHN HAYS, Jr.....	4 Union Pl., Troy, N. Y....	Dec.	5, 1893
OGDEN, HENRY NEELY.....	42 Main St., Norfolk, Va....	Oct.	3, 1893
WADSWORTH, JOEL EDWARD.....	University of Minnesota, Minneapolis, Minn.....	Dec.	5, 1893

FELLOW.

KIDDLE, ALFRED WATTS.....	38 Park Row, New York City.	Oct.	3, 1893

CHANGES AND CORRECTIONS.

MEMBERS.

ANDREWS, D. M .....U. S. Engineer office, Montgomery, Ala.
BODFISH, S. H.....58 B st., N. E., Washington, D. C.
BONZANO, A.....331 S. 18th st., Philadelphia, Pa.
BRINCKERHOFF, H. WALLER.....621 Broadway, New York City.
BROWN, CHARLES O.....61 Broadway, New York City.
BRUEN, FRANK.....Tower Place, Forest ave., Dayton, Ohio.

BUTTERFIELD, F. E.....Lake St. Elevated R. R., Security Bldg., Chicago, Ill.
COYODE, J. H .. ..(Care Porter & Coates), 900 Chestnut st., Philadelphia, Pa.
CRAIG, C. M.....P. O. Box 37, Savannah, Ga.
DAGRON, JAMES G .....419 N. Charles st., Baltimore, Md.
FAIRLEIGH, JAMES A..... Chattanooga, Tenn.
GARFIAS, IGNACIO.....Calle de Chavarria, No. 8, Mexico, Mexico.
GOAD, CHARLES E.....15 Wellington st., West, Toronto, Canada.
GREENE, B. D.....212 Madison ave., New York City.
GRIMM, C. R.....7018 Tulip st., Tacony, Philadelphia, Pa.
HARING, JAMES S.....Lock Box 54, McKeesport, Pa.
HOXIE, R. L.....Capt. Corps of Engineers, U. S. A., Pittsburgh, Pa.
JENNINGS, H. C.....939 Alta st., Denver, Colo.
JOHNSTON, H. G.....Corsicana, Texas.
KERNOT, W. C .....University of Melbourne, Australia
LEDERLE, GEORGE A..... 516 Ashland Block, Chicago, Ill.
LUCAS, D. JONES.....1100 Girard st., Philadelphia, Pa.
LUTZ, U. S.....1527 North 19th st., Philadelphia, Pa.
MACLAY, WILLIAM W.....Box 512, Glens Falls, N. Y.
MCDONALD, JOHN A.....(Care Messrs. McDonald Scales & Co.), 4 Chapel St., Cripplegate, London, E C., England.
MITCHELL, HENRY.....60 Buckingham st., Cambridge, Mass.
MORRIS, S. FISHER.....Pulaski Iron Co., Eckman, West Va.
NELLES, GEORGE T.....318 Commercial Bldg., St. Louis, Mo.
NICHOLS, L. A.....56 Hotel Barteau, St. Paul, Minn.
OLNEY, GEORGE R.....Superintendent of Public Works, New Rochelle, N. Y.
OPDYKE, S. B., Jr.....1430 South Penn. Square, Philadelphia, Pa.
PAINE, A. B.....Palatine Hotel, Newburgh, N. Y.
PARET, M. P.....53 Manufacturers' Record Bldg., Baltimore, Md.
PEW, ARTHUR .....Chief Engineer M. G. & A. Ry., Macon, Ga.
PRINDLE, FRANKLIN C.....Civil Engineer U. S. N., Navy Yard, Portsmouth, N. H.
ROWE, SAMUEL M.....6030 Ellis ave., Chicago, Ill.
SCHUYLER, JAMES D.....1848 S. Flower st., Los Angeles, Cal.
SHANKLAND, E. C.....Engineer to D. H. Burnham, 1142 The Rookery, Chicago, Ill.
SHAW, GRANVILLE W.....142 W. Main st., Room 5, Louisville, Ky.
STEVENS, HORACE E.....100 West 4th st., St. Paul, Minn.
STONE, E. H ....Superintendent W. & W. East Coast Ry., Waltair Station, Madras Presidency, India.
TEMPLE, W. H. G .....75 Westminster st., Providence, R. I.
WILLIAMSON, F. STUART.....1 Broadway, New York City.
WROTNOWSKI, ARTHUR F.....172 N. Rampart st., New Orleans, La.

ASSOCIATE MEMBERS.

CUMMINGS, R. A.....1721 Mt. Vernon st., Philadelphia, Pa.
HARDY, HARRY .....Pochutla, Oaxaca, Mexico.
HEALY, JOHN F.....Copeville, Franklin P. O., Wash.
HOOD, R. H.....12th and F sts., N. W., Washington, D. C.
ROBERTS, NATHANIEL.....183 Carteret ave., Jersey City, N. J.
THOMSON, T. KENNARD..... ...321 E. Main st., Stamford, Conn.

JUNIORS.

BONNETT, L. B..... .....414 S. Broad st., Elizabeth, N. J.
DAVIS, A. L.. .....Chief Engineer The Vermont Construction Co., St. Albans, Vt.
FARGUSSON, MARK..... .. Southport. N. C.
FRENCH, J. B.....Assistant Engineer C. & O. Ry., Richmond, Va.
FUERTES, JAMES H.....Ithaca, N. Y.
HARWI, S. J.....Flushing Hotel, Flushing, N. Y.
MCKENZIE, THOMAS .....174 Weybosset st., Providence, R. I.
MYERS, E. T. D., Jr.....1103 Grove ave., Richmond, Va.
PURSLOW, E. J. S.....Santa Barbara, Cal.
RITTENHOUSE, HARVEY.....Crewe, Va.
SPEIDEL, H. S.....115 Fair st., Paterson, N. J.
SWEITZER, N. B., Jr .....The Portland, Washington, D. C.
TAPPAN, ROGER.....30 St. James ave., Boston, Mass.

FELLOW.

CLEMENT, VICTOR M..... .....(Care Barnat & Bros.), Johannesburg, South African Republic.

RESIGNATIONS.

MEMBERS.	Date of Resignation.
COLTON, OREN B.	December 31, 1893
DURHAM, C. WHEELER.	December 31, 1893
FRITH, ARTHUR J.	December 31, 1893
GILBERT, CHARLES PHELPS.	December 31, 1893
HILL, WARREN E.	December 31, 1893
MILLER, HARRY IRVING.	December 31, 1893

ASSOCIATE MEMBER.

STARRETT, THEODORE	December 31, 1893

ASSOCIATES.

BROWN, JACOB B.	December 31, 1893
REEVES, PAUL S.	December 31, 1893

JUNIORS.

BOGGS, EDWARD M.....December 31, 1893
CARRÈRE, J. MAXWELL.....December 31, 1893
DAVIS, HENRY L.....December 31, 1893
FERRER, CARLOS F.....December 31, 1893
PARISH, WAINWRIGHT.....December 31, 1893
PRINCE, JULIUS.....December 31, 1893
ROEHM, GEORGE E.....December 31, 1893
VAUX, DOWNING.....December 31, 1893

DEATH.

YOUNG, WILLIAM C.....Elected Honorary Member, March 1, 1892; died December 22, 1893.

ADDITIONS TO

LIBRARY AND MUSEUM.

From Bureau of Statistics of Labor, Boston, Mass.:
Twenty-third Annual Report, March, 1893.
Annual Statistics of Manufactures, 1892.

From Canadian Society of Engineers, Montreal, Canada:
Transactions, Vol. VII, Part 1. January to June, 1893.

From Clayton Air Compressor Works, N. Y.:
The Widening Use of Compressed Air.

From H. J. Cole, New York:
Conditions de Concours pour les Projets de deux Ponts-Route sur le Danube a etabler sur le territoire de la ville de Budapest.

From Cornell University, Ithaca, N. Y.:
Library Bulletin, Vol. III, No. 5.

From J. J. Crawford, San Francisco, Cal.:
Eleventh Report of the State Mineralogist (First Biennial) two years ending September 15th, 1892.

From Dyckerhoff & Söhne, Amöneburg, Germany:
Ueber die Anlage und den Betrieb von Stauweihern in den Vogesen.

From Alston Ellis, Director, Fort Collins, Colo.:
Fourth Annual Report of the Agricultural Experiment Station, 1891, Fort Collins, Colo.

From J. G. W. Fijnje, The Hague, Holland:
Beschouwingen over eenige Rivieren, Waaronder Nederlandsche, 4 vols.
De Luchtvaart.
Beschrijving van de Peilschalen, Haakelbouten en Andere Verkenmerken, langs de Rivieren de Boven-Rijn, de Waal, de Merwede, de Ijssel, de Neder-Rijn, de Lek en de Boven-Maas. 5 vols.

From Harvard University, Cambridge, Mass.:
The Harvard University Catalogue, 1893–94.

From Institution of Engineers and Shipbuilders in Scotland, Glasgow, Scotland:
Transactions, Vol. XXXVI, 1892–93.

From Institution of Mechanical Engineers, London, Eng.:
Proceedings, August, 1893.

From William Pierson Judson, Oswego, N. Y.:
Annual Report upon the Improvement of Harbors on Lake Ontario, East of Oak Orchard, N. Y.:

From E. H. Keating, Toronto, Canada:
Annual Report of the Superintendent of the Toronto Water Works for the year ending December 31st, 1892.

From Alexis de Kovalletzky, Commissioner for Russia, Chicago, Ill.:
An Economical System of Sanitary Drainage for City and Country.
How Shall We Make Our Homes Healthy?

From Legation of Venezuela, Washington, D. C.:
Ferrocaril Central de Venezuela, Plan General, Parte de Caracas a Sta. Teresa.
Plano General del Ferrocaril de La Guaira a Caracas.
Plano General del Puerto Muelle Tajamar de La Guaira.

From G. Leverich, Brooklyn, N. Y.:
Report of the Trustees of the New York and Brooklyn Bridge for the year ending December 1st, 1893.

From Maine Central Railroad Company, Portland, Me.:
Thirty-second Annual Report of the Maine Central Railroad Company, presented at the Annual Meeting, December 20th, 1893.

From Daniel W. Mead, Rockford, Ill.:
Notes on the Hydro-Geology of Illinois in Relation to its Water Supplies.

From Stuart Murray, Melbourne, Aus.:
The Goulburn Weir and its Dependent System of Works.

From Patent Office, London, Eng.:
Abridgments of Specifications for Patents, 12 parts.

From Geo. W. Rafter, Rochester, N. Y.:
On Some Recent Advances in Water Analysis and the Use of the Microscope for the Detection of Sewage Contamination.

From Miguel Serrano, Delegate-General for Mexico, Chicago, Ill.:
Comision Geografico-Exploradora de la Republica Mexicana, Catalogo de los Objetos que componen el contingente de la Comision Exposicion Internacional Columbina de Chicago en 1893.

From J. Herbert Shedd, Providence, R. I.:
Annual Report of the City Engineer of the City of Providence for the year 1892.

From Siemens & Halske, Chicago, Ill.:
Als Souvenir bei Gelegenheit der Weltausstellung in Chicago.
Three Photographs of Current Generators.
Circulars.

From Hamilton Smith, London, Eng.:
Half-Yearly Report of the Directors of the El Callao Mining Company, September, 1893.

From John C. Smock, State Geologist, Trenton, N. J.:
Annual Report of the State Geologist (New Jersey) for the year 1892.

From F. J. E. Spring, Bombay, India:
Album of Photographs of Kistna Bridge, Bezwada, India.

From U. S. Bureau of Education:
Report of the Commissioner of Education, 1889–90.

From U. S. Department of State:
Consular Reports, December, 1893.

From U. S. Patent Office:
Annual Report of the Commissioner of Patents for the year 1892.

From Waring, Chapman and Farquhar, Newport, R. I.:
The Memphis System of Sewerage at Memphis and elsewhere.

From E. Wilder, Treasurer, Topeka, Kansas:
Annual Report of the Atchison, Topeka and Santa Fé Railroad for the fiscal year ending June 30th, 1893.

BOOK NOTICES.

THE THEORY AND PRACTICE OF MODERN FRAMED STRUCTURES. DESIGNED FOR THE USE OF SCHOOLS AND FOR ENGINEERS IN PROFESSIONAL PRACTICE.

Half morocco. 9 x 11 ins., 527 pp., John Wiley & Sons, 1893. This work, the most recent and probably destined to be the most generally useful of all existing works on framed structures, has been written by Prof. J. B. Johnson, C. W. Bryan and F. E. Turneaure, who have been assisted by the following gentlemen, writing specially on the subjects named: J. W. Schaub, on Swing Bridges; F. H. Lewis, on Structural Steel and Specifications; A. L. Johnson, on Manufacture

and Inspection of Structures; C. T. Purdy, on Tall Building Construction; Geo. H. Hutchinson, on Mill Construction; D. A. Molitor, on Æsthetic Considerations, and F. W. Skinner, on American Methods of Bridge Erection.

The shape of the book recalls Col. Merrill's earlier work, and is similar to Prof. Du Bois' work. The paper, printing and general execution are excellent, and the numerous illustrations very well done. The large pages give opportunity for reproductions of ample size and clearness.

Full credit is given to the several authorities from which extracts have been made: T. H. Johnson's straight-line formulas for columns are given with due credit and praise; cantilever and arched bridges are treated by Mr. Turneaure. The complete design for single-track railroad bridge of 150-ft. span is by Mr. Bryan, and suspension bridges and standpipes and elevator tanks are specially treated by Prof. Johnson.

The analytical discussions seem complete and clear. The illustrations of structural details are well selected and neatly presented. Tables of data are given more for illustration than for reference.

A few trifling errors in typography are observed, and specialists will no doubt find material within the covers for criticism. It is difficult in one book to cover every subject completely and present every type of construction. The work has been done with great care and conscientiousness, and the resulting volume is pleasing and cannot fail to be valuable as a text book to students and serviceable to the practicing engineer as a book of ready reference.

A FIELD BOOK FOR ENGINEERS.

By Daniel Carhart, C. E., 4 x 7 ins., morocco limp, pp. XII + 281, 99 cuts. Ginn & Company, Boston, 1893.

A pocket manual of convenient size, with all necessary tables, formulas, etc., for the use of engineers and surveyors in the field, would seem to be greatly desirable. Prof. Carhart has issued his book to meet what he considers a demand for such a handy book of reference.

The first chapters are devoted to the subjects which first present themselves in regular work, reconnaissance, preliminary survey and location, with general instructions in the use of the required instruments. The following 66 pages are given to simple and compound curves, with definitions and fundamental formulas, and different problems which the engineer meets in his work.

The last chapters deal, more especially, with railway work, culverts, bridges, tunnels, frogs and switches, etc.

A large number of tables close the volume, some of which are taken from former works. Table IX, Logarithms of Numbers, is new to this work, is printed in clear bold type, and makes an attractive appearance.